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**Sneak Hands-on Preview:
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 mini DVD player...**

**Review of Sony's
 compact VPL-SC50M
 Video Projector**

**Build your own low cost Surround
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READER INFO NO.1

Electronics Australia

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May 1999

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On the cover



You know a new audio-visual technology like DVD has 'come of age' when personal portables start appearing. In this issue we preview Pioneer's PDV-LC01 'personal portable' DVD player — which can also be used with a standard TV set or video projector if you wish. (Photo by Michael Pugh)

Stamp kits to be won



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Basic Stamp distributor RTN has given us three very nice development kits, to be won by EA readers...

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Letters to the Editor

Wrong attitudes

I'm wondering if part of the reason the Australian electronics industry has reached its present run-down condition could be the attitudes of many of the people in it. Recently I needed to obtain some common alphanumeric liquid crystal display modules, so I e-mailed four well-known large local companies which advertise these, regarding availability and pricing.

To my surprise, only one company (R&D Electronics) bothered to reply. They immediately faxed me a lot of information on what they had available so I could select the exact module I needed, and generally couldn't help me enough. Naturally I dealt with them, but what does this say about the attitude of the other companies? Perhaps they feel that customers are a nuisance they can do without.

On another subject, I wonder if EA should have a monthly column dedicated to the subject of 'Health and Electronics', so that 'Forum' could be used for the discussion of other subjects? Many people I know say they no longer read Forum because they have no interest in what's been discussed there almost exclusively for several years now.

Bob Parker, Sydney NSW (by e-mail)

Highly skeptical

I would like to comment on the article in January EA by Stewart Fist. Firstly let me state, that as a technician I am highly sceptical of any claims currently being made about the harmful effects of EMR at any level (except perhaps, inside a Microwave Oven). As Mr Fist rightly pointed out, most technical people tend to be that way.

The reasons for my scepticism are borne out of that fact that all this publicity about EMR really started not because there were widespread or even isolated cases of illnesses that could be attributed to exposure to EMR, but rather concern about real estate values if one of these dreaded phone towers were to be erected close to one's residence.

It took a while to find an effective weapon to combat these intrusions, but when some bright spark said, hey, can you absolutely guarantee that this RADIATION (and they always use THAT

word rather than radio waves, emission or other more benign sounding terms) is safe? When the authorities responded in a less than convincing manner, they hit the jackpot when it came to arguing their case!

I have seen meetings where ordinary people, worried about the effects on their children from a cell phone antenna and fighting tooth and nail to have it removed, when 100 metres down the road there is a Paging Antenna which has been in that place for some years before mobile phones took hold and emitting (I should say RADIATING) 20 times more RF power than the phone antenna, and that one got completely ignored.

And as for claims about headaches when using phones, I just wonder if a significant proportion of sufferers have a little more in mind, i.e., litigation can be very profitable these days with no shortage of lawyers willing to come to the party. Especially after the first case is won! Remember RSI?

Well, I am sure that there are many very knowledgeable people working on this subject, but I can't help but feel that there are a number of factors other than health concerns driving this debate.

Horst Leykam (by e-mail)

Upconverter hints

I built the Upconverter for your Spectrum Analyser (September 1996), and had problems with 2MHz breakthrough. However I have done further work, and now have the breakthrough down to just a few dB above noise. The following information may be useful, if others have the same problem as me. By the way the unit was built from a Dick Smith kit, which did contain all parts as specified. I am also an experienced constructor, being professionally involved in electronics for very many years.

The solution involved many steps, each gaining a few dB, as follows:

I cut the signal output track at the mixer, and used a short length of miniature 50-ohm coax to link directly to the output socket from the mixer pin and adjacent earth point.

I completely screened the mixer pins and input capacitor with copper foil.

I completely screened both the input and output BNC connector 'active' parts.

Editorial Viewpoint

By experimenting further, I found that some additional braid earth straps from other parts of the trackwork helped, including one from the voltage regulator mounting bolt earth track to the nearest standoff mounting bolt (chassis) at the DC power input end.

Garth Jenkinson, VK3BBK (by e-mail)

Disappointed

I have been reading your magazine now for nearly 40 years, and have found it invaluable in keeping up with developments in the electronic industry. The last issue (Feb 99) was a great disappointment because your magazine seems to have fallen into the trap of printing thinly disguised advertising as readers' comments.

I refer to the letter of an employee of Hewlett-Packard in the 'Letters to the Editor' section. Telstra can well afford its own advertising for Big Pond, so publishing letters extolling the virtues (sic) of Big Pond can only cast doubt on the editorial independence of an otherwise fine magazine.

Jeff Lean, NSW (by e-mail)

Cybug distributor

Your article on the Cybug in the March edition of EA was certainly in depth and educational. The Cybug and its add-ons are certainly an entertaining and intriguing implementation of sensor driven analog circuitry.

The article mentioned that DSE are distributors for the Cybug in South East Asia. We would like to point out that DSE is not the only distributor of Cybug in Australia. We at robot-Oz, a largely internet-based business, are also — and will continue to be — a distributor for the Cybug, and its Predator/Prey and Hunger add-on boards.

Readers can visit our website to see the original home of the Cybug in Australia, at <http://www.robotOz.com.au>.

Peter & Megan Hamer, Perth WA. ♦

Letters published in this column express the opinions of the correspondents concerned, and do not necessarily reflect the opinions or policies of the staff or publisher of Electronics Australia. We welcome contributions to this column, but reserve the right to edit letters which are very long or potentially defamatory.



WHEN I WAS a teenager back in the sleepy 1950s, a surprising number of my friends had electronics as a hobby. Like me they were constantly building their own hi-fi amplifiers, speaker systems, TV receivers, tape recorders, test equipment, amateur radio gear and so on. Not just because it was tremendous fun, but also because we could provide ourselves with equipment that we'd otherwise never have been able to afford, on our meagre pocket money or starting wages.

Needless to say we were also gaining valuable practical experience in the process, so it's not surprising that many of us went on to make a career in the electronics industry. In fact some of my fellow hobbyist friends from those days went on to become exalted chief engineers, research scientists and high-level engineering academics.

The point I'm making is that all around the world, the same pattern has been evident: keen electronics hobbyists tend to turn into innovative engineers, scientists and technicians. So one important and relatively inexpensive way for any country to nurture a flourishing, dynamic and wealth-generating electronics industry is to encourage hobby activity, clearly.

We wouldn't want to help Australia's hobbyists, now — would we?

In Australia our politicians and bureaucrats never quite seem to have grasped this concept, despite their rhetoric. The reality is that over the years, they've gradually made it *harder and harder* for young people to pursue electronics as a hobby.

For example back in the 1980s when virtually all of our manufacturers of electronic components had gone out of business, it became clear that an anomaly had developed in the customs duty applied to imported components. Instead of having their level of duty reduced, which would at least have encouraged both local equipment manufacture and hobby activity, most of the components were still attracting a tariff *higher* than that applied to fully assembled imported equipment. As far as I'm aware this has never been changed, explaining why it hasn't been practical for hobbyists to build so many items of electronic equipment for quite a few years now.

Then there's the tightened regulations about equipment connected to the public switched telephone network, which have basically made it impossible for hobbyists to build and use their own phones, modems or telephone accessory equipment.

Only a few days ago, though, I've been made aware of yet another area where our bureaucracy is actively discouraging hobby activity. This is with regard to sales tax on hobbyist kits, and in particular kits for audio equipment like amplifiers, surround sound decoders and so on. This is of course one of the few areas where hobbyists have any chance of being able to save money by assembling their own equipment. Yet it appears that a sales tax level of no less than 32% has been levied on all such kits, compared with the 22% applied to virtually all other types of kit.

Have you ever heard anything crazier? A sales tax on any kind of hobby kit is bad enough; after all, they're just a bag or box of parts, to make it easier for a hobbyist to make their own gear and learn by doing. But to make the tax on 'audio' kits a whopping 45% larger again seems the ultimate in stupidity, surely.

We really don't want to encourage electronics hobbyists in Australia, do we? After all, they might find how much fun it is, and go on to rebuild our crumbling manufacturing industry. We wouldn't want that, would we?

Jim Rowe

WHAT'S new

in the ever-changing world of electronics



Smaller open-panel hifi speaker from Lorpen Audio

South Australian hifi speaker system maker Lorpen Audio has released a new 'baby' version of its open panel speaker family, called the HP2. It's said to have similar perfor-

mance qualities to the existing HP3, but is significantly smaller in size.

In the HP2 high frequencies are handled by the famous Focal TC 90TXD inverted titanium dome tweeter, while wideband phase coherent midrange frequencies are handled by drivers mounted on the panel, which is machined from a solid piece of 40mm thick high quality MDF. The drivers, the same used in the HP3 and HP4 model speakers, are chosen for their performance characteristics on an open panel. The bass chamber is ideally situated near the floor and behaves in a

similar way to a subwoofer. It is a ported design of about 35 litres and uses two 165mm woofers.

Polyswitch overload protection is employed to prevent damage due to playing too loudly. This combined with internationally accepted quality control measures during manufacture, ensure consistency and reliability matches the excellent sound quality.

The RRP for the Lorpen Audio HP2 is \$2295. For more information contact Lorpen Audio, 11 Moldavia Walk, Osborne SA 5017.

New Digital 8 camcorders from Sony

Sony Australia has announced three new Digital 8 camcorders that combine the Hi8/8mm camcorder format with digital video technology, resulting in professional image quality and compact disc-like sound on an inexpensive readily-available media.

Digital 8 records digitally, with up to 500 lines of resolution on Hi8 video cassettes. It is also backward compatible, allowing Hi8/8mm tapes to be played back in a Digital 8 Handycam.

Sony claims that its Digital 8 format camcorders achieve professional standard DV picture and sound quality by virtue of their 500-line horizontal resolution, plus 16-bit/12-bit PCM audio recording and digital dubbing to prevent picture and sound quality degradation.

The three new Digital 8 camcorders all incorporate an InfoLithium battery system offering up to 10 hours of continuous recording, with a constant display of the remaining battery time in minutes, plus an improved NightShot facility which can be used with the '+Slow Shutter' button for a brighter picture and more range, even in total darkness. They also provide full playback functionality for tapes recorded in both the analog 8mm and Hi8 formats, ensuring that users can continue enjoying their existing video collections.



The ability to playback analog 8mm tapes is due to the Digital 8

camcorders'

dual-speed motor. During playback, a tape's recording format is detected automatically and the rotation speed of the drum adjusts between the 4500rpm of Digital 8 recordings and the 1500rpm (PAL) required for Hi8 or standard 8mm. Backward compatibility is further enhanced with the A/D conversion feature, which allows Digital 8 camcorders to digitally output 8mm analog recordings for digital dubbing or editing on a PC. As a result, the digital copies will retain their integrity much better than the analog originals.

The Digital 8 camcorder also use an i.LINK terminal (also known as IEEE1394) to facilitate easy transmission of digital quality data to a DV VCR, another Digital 8 camcorder or to a PC for capturing single frames or editing of digital footage. They also feature S-Video, RCA, Mic IN and LANC connections.

Audio processors boast tube circuitry

Audio signal processing specialist dbx has added the 566 vacuum tube compressor and 576 vacuum tube preamp/compressor to its 'classic' Silver Series lineup.

The dual-channel 566 provides all the features you could possibly want in a compressor, including custom-designed analog VU meters that monitor valve level, gain reduction or output levels. Also featured is a sidechain monitor and dbx's novel Contour function, which allows low-frequency material to pass through the threshold without triggering unmusical compression effects.

The 576 offers in addition a preamp equipped with +48V phantom power, a 20dB pad, phase invert and low-cut filter along with a three-band EQ with sweepable mid and selectable mid Q, available insert loop, and the ability to send the preamp signal directly to the compressor.

Both units use hand-selected 12AU7 valves, which dbx says are known for their consistently 'warm' sound and reliable longevity along with excellent triode gain matching, distortion, microphonics and drive characteristics. And with the optional dbx TYPE IV Conversion System output, the valve processing can be directly translated into the digital world.

The 566 and 576 are each available for an RRP of \$2995. For more information contact distributor Jands Electronics on (02) 9582 0909.

Sony expands Wega flat screen CTV range

Barely 12 months after the successful launch of the Sony FD Trinitron Wega (pronounced 'vay-ga') — the world's first flat-screen television — in February last year, Sony Australia has announced the release of four new FD Trinitron Wega models. The new Wega EF series compris-



es a 34" model (SRP \$3699), a 29" model (SRP \$1999), a 25" model (SRP \$1399) and a 21" model (SRP \$949).

To achieve true flat-screen technology in the cathode ray tubes (CRTs) used in the Wega models. Sony engineers developed a High-Focus Electron Gun, which, with a 20% improvement in focus, overcame the problem of focusing in the corners of the screen's reverse side.

Added sound power with the Wega YF series is achieved through the six speakers which are built into the television. These vertical twin speakers are able to reproduce an extreme range of sounds demanded by various broadcasting systems and video hardware. The SRS Labs TruSurround synthetic surround sound system is also inbuilt, to provide an enveloping surround effect without the need for rear speakers.

Along with the other new technologies developed specifically for the Wega range, they also include a newly developed high-tension aperture grille for flat screens, delivering a razor-sharp picture. The grille also features a stable vertical tension which absorbs expanding heat energy, ensuring the beams always hit the correct spot on the phosphor and preventing colour spill.

Megapixel digital camera from Canon

Canon's new PowerShot Pro 70 offers high resolution image capture and professional features and is claimed as the first digital camera to incorporate two CompactFlash memory card slots for increased shot capacity. It is a true megapixel camera with a 1.68 million pixel CCD sensor and fitted with a powerful 2.5x optical zoom lens, equivalent to a 28-70mm zoom lens in 35mm camera format.

The PowerShot Pro 70 employs new Canon focussing technology known as Phase Differential Detection (PDD) for accurate auto focusing. In addition, it uses dedicated image processing hardware to produce better quality pictures faster.

Advanced controls include exposure compensation, aperture-priority auto-exposure, full external 'hot sync' flash support, fully automatic white balance, high speed burst mode (allowing up to four frames/second)



allowing up to a total of 20 shots, automatic shutter speed control up to 1/8000 second and a 12cm macro mode.

Images can be captured in one of three compression modes: high quality, normal or CCD Raw mode — at a maximum of 1536 x 1024 pixels or 768 x 512 pixels in 'low resolution' mode.

The Canon PowerShot Pro 70 is available from Canon dealers and selected retail stores and has an RRP of \$2699.

New speakers from JBL

Loudspeaker specialist JBL has introduced a new range of models, the TLX Series, which continue the firm's tradition of excellence. The new-look TLX range consists of five models, all three-way systems distinguished by a number of technological advances for deeper bass and cleaner highs.

The TLX Series employs JBL's proprietary titanium high frequency driver technology. Now in its second generation employing a nitrogen evaporation process, this allows the formation of a stress-free titanium dome barely 25 microns thick (less than a single human hair).

The woofers and midrange drivers include an innovative non-magnetic chassis which ensures precisely focused magnetic energy and full dynamic range performance. In addition, proprietary coated pulp cones further provide for increased durability, cone stiffness and lower mass. Aluminium voice coil wiring and ferrofluid in the magnetic gap also ensure more accurate reproduction.



The speakers are also fitted with attractive front grilles which protect the drivers and help eliminate the reflections that compromise the performance of most conventional loudspeakers. The grille frames have been cut away around the tweeters, to allow maximum high-end clarity.

The five models range from the TLX2 (RRP \$999), a three-way bookshelf/floor stand enclosure with a 200mm woofer and a 100mm midrange, to the TLX10 (RRP \$1799), a three-way bass reflex enclosure with two 200mm bass transducers and a 100mm midrange transducer.

For more information contact Convoy International, on (02) 9700 0111.

WHAT'S new

in the ever-changing world of electronics

Clock radio has 'soothing sounds'

A new Digitor clock/radio with 'soothing sounds' built-in has been launched by Dick Smith Electronics. The 'soothing sounds' are designed to relax the listener and send them off to sleep.

There are four sound options to choose from: birds calling, waves breaking, rainforest sounds and pond-life. The user has the option of setting the sound to run for 90, 60 or 30 minutes and the volume can be adjusted.

The Digitor clock/radio is powered by either batteries or the supplied AC adaptor. It has a dual alarm that can be set for either AM/FM radio or buzzer. The dual alarm allows two different times to be set, allowing it to be used for two different members of a household, for example. It has a large LCD screen with a calendar that is Year 2000 compliant and can be set to day/month or month/day format.

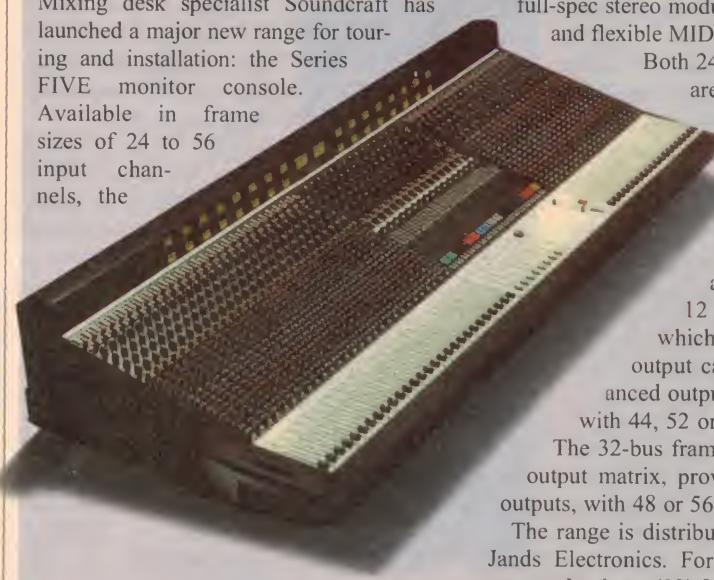


There's more, too: it has a built-in thermometer which displays the temperature in Celsius or Fahrenheit, and also a blue backlight that can be adjusted to off, low or high.

The Digitor Natural Sounds Clock Radio is available from Dick Smith Electronics Australia-wide, Dick Smith Electronics Powerhouse stores or via mail order by calling DSE Direct Link on 1300 366 644, for an RRP of \$79.50.

New monitor desk from Soundcraft

Mixing desk specialist Soundcraft has launched a major new range for touring and installation: the Series FIVE monitor console. Available in frame sizes of 24 to 56 input channels, the



Series FIVE monitor boasts a comprehensive standard feature set including LCR panning, aux master levels on 100mm faders, full-spec stereo modules and FX returns, and flexible MIDI scene control.

Both 24 and 32-bus frames are available to meet demands for larger, more complex output capability. The 24-bus version includes as standard a 23 x 12 output matrix

which gives a maximum output capability of 38 balanced outputs, and is available with 44, 52 or 60 input channels.

The 32-bus frame carries a 23 x 16 output matrix, providing 50 balanced outputs, with 48 or 56 input channels.

The range is distributed in Australia by Jands Electronics. For more information contact Jands on (02) 9582 0909.

CNN & Nokia provide 24-hour mobile news service

CNN Interactive has launched CNN Mobile, claimed as the first mobile telephone news and information service to be available globally with pan-regional content. CNN Interactive worked closely with Nokia to develop the platform for CNN Mobile.

The service, which is initially targeted at GSM mobile phone customers in Europe and Asia/Pacific, is the latest way



that consumers can access CNN while they are on the go and at any time they choose. CNN Mobile is the world's first global value-added service to be built on the Wireless Application Protocol.

Produced by the same team responsible for the award-winning Web site CNN.com, CNN Mobile features breaking news, world news and regional news (Europe, Asia-Pacific, Middle East, Latin America and United States); weather temperatures and forecasts; world business news, market updates and currency rates; world sports news and scores; entertainment news; travel city guides; and features. Operators will customize the service based on their market and their subscribers' interests. CNN Interactive updates the CNN Mobile service 24 hours a day, seven days a week. News headlines and market information are updated every 30 minutes, and sports scores and weather forecasts are updated regularly throughout the day. Breaking news is delivered immediately.

New 'flagship' open panel speakers from Lorpen Audio

South Australian speaker manufacturer Lorpen Audio says its new HP5 Aerogel flagship system embodies a 'no compromise' approach designed to extract the full performance potential from the company's open panel technology. The units weigh in at 72kg each and are 1380mm tall, and are claimed to deliver exceptional dynamics and stereo imaging.

The efficiency of the HP5 Aerogel is conservatively rated at an exceptional 92dB, achieved at an 'amplifier friendly' 8Ω impedance level. This allows a 50W amplifier to achieve the sound level which would require a 200W amplifier with typical 89dB-efficiency 4Ω speakers.

Focal 120TDX2 tweeters are used on the front and rear of the panel to handle the high frequencies. The cone is an inverted 20mm titanium dome, coated with titanium oxide. They weigh a very heavy 1.5kg each and feature a low resonant frequency, which allows a first-order crossover to be used. The rear tweeter is wired in the same phase as the rear radiation of the panel.



The panel handles wide band midrange, from 230 - 3200Hz. It is machined from 25mm MDF. The rear of the panel is braced with a layer of 50mm concrete, while the front is doped with coats of thinned fibreglass resin. This produces a panel of extreme strength and tonal neutrality. Four 6.5" Audax aerogel drivers mounted on the panel in a vertical array provide the transducers for the panel.

The bass system uses a 10" Focal polyglass cone driver. It is a very efficient driver (92dB), featuring fast and dynamic bass due to the edge wound voice coil and low mass polyglass cone material. The bass enclosure has a volume of 65 litres and is tuned with a 62mm diameter port. To minimize transient smearing and coloration by the box, the sides are built from 18mm MDF that is reinforced with a laminate of 10mm glass. Other sides are built from 25mm MDF. Internal braces are also applied.

The crossover employs the finest audiophile grade components including Hovland Misicap capacitors and Goertz copper foil inductors.

The HP5 system is claimed to offer a build quality and level of performance rarely seen anywhere. It carries an RRP \$7800 per pair. For more information contact Lorpen Audio, 11 Moldavia Walk, Osborne SA 5017.

Multifunction desktop box

Canon has extended its range of multifunction devices with the MultiPASS L60, a professional quality laser printer, high speed fax, copier and scanner designed to operate directly from your desktop. It's also compact and easy-to-use.

Featuring a printing speed of six pages per minute, the unit delivers 600dpi resolution and offers time-saving features such as dual access, which allows users to carry out multiple tasks such as printing while receiving faxes into memory. Faxes can also be received while copying or scanning.

With a 14.4kb/s modem, faxes can be sent and received directly from the PC at a fast six seconds per page.



The L60 can also operate as a stand-alone fax machine and has memory capabilities to store up to 90 pages. Dialling features allow one-touch speed dialling for 16 fax numbers and coded speed dialling for 100 locations. Additional features include automatic fax/phone switch, answering machine and extension phone connectability.

The Canon MultiPASS L60 is available from Canon dealers and selected retail stores at an RRP of \$1499.

DESIGN BREAKTHROUGH

The new VAF DC-X design breakthrough

NEW LEVELS OF ACCURACY PHYSICAL FILTERING TECHNOLOGY

High Sensitivity: Over 95 dB/W/M

Flat Response: 35Hz-20KHz +/-2db

Deep Bass: -3db at 31Hz

Flat Phase: 120Hz-20KHz +/-5deg

High Power: Amps up to 200W / ch

Price: \$1099 Kits without cabinets

\$1399 Kits with assembled cabinets

\$1799 Fully assembled



13 VAF Kits Priced from \$263 pr. to \$8000 pr.
Custom finishes available.

Critically acclaimed.....

"VAF Research has certainly lifted kit loudspeaker performance to new levels with these models"
Electronics Australia

"Mind bogglingly good value for money"
Best Buys Speakers Amps Receivers

"Are these the best loudspeaker kits in the world...On the evidence, we'd have to say VAF's I-66 design would be an odds on certainty to take out the award"
Best Buys Speakers, Amplifiers, Receivers

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Hi-Fi Best Buys

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gas CES - 2

Continuing his report on the mammoth Consumer Electronics Show held in Las Vegas earlier in the year, Louis Challis now describes some of the more technically interesting and innovative products he noticed there. These include a raft of new products incorporating speech recognition, a car computer, a GPS-linked watch, consumer-orientated 'mayday' communication systems, home automation systems and new battery technologies.

HAVING BRIEFLY reviewed the large visual and most audible of the 1999 CES displays in last month's issue of *EA*, it's time we took a look at some of the smaller (and in some cases the smallest), most innovative and exciting new electronic releases which caught my eye.

One of the most exciting groups of products was the speech recognition consumer products. Haven't you always wanted to be able to dictate your letters, reports, memos or even accounts, in the absence of formal typing skills? Most people do, and whilst few were aware, there have been expensive computer programs like the Dragon series, or more recently the IBM series of software/hardware combinations, that were commercially available for satisfying such needs. The problem is that Mr Average didn't initially have the \$5,000+ required to obtain such a system.

ware available for the home or small office PC user. When coupled to the Philips 3-in-1 SpeechMike (Type 6173), the user is able to integrate acoustic input via the microphone, sound output via the loudspeaker and control of Windows via the trackball, in a single hand-held device.

I found the demonstration most persuasive, to the point that I requested a demonstration set of software and hardware be forwarded expeditiously for this review. In fact I'd hoped to dictate the review using the FreeSpeech 98 software, however it was not to be.

I have devoted appropriate time to training the computer to recognise my speech and convert my voice output directly into screen text. FreeSpeech 98 uses natural continuous speech recognition, as well as recognising the explicit voice commands associated with application control. The software enables the user to create, edit and format documents in

ing from an alternative word list, simply by speaking into the application as if you were using a typical spell check feature.

While I'm not in a position to compare the functional performance of Philips FreeSpeech 98 with its more expensive competitors, with a current US selling price of \$39 for the software (purchasable over the Internet) this is clearly a very attractive product. Whilst you don't have to purchase the Philips 3-in-1 SpeechMike to use the software, you'd be silly not to, as it makes a considerable ergonomic difference to the user-friendly characteristics of the program.

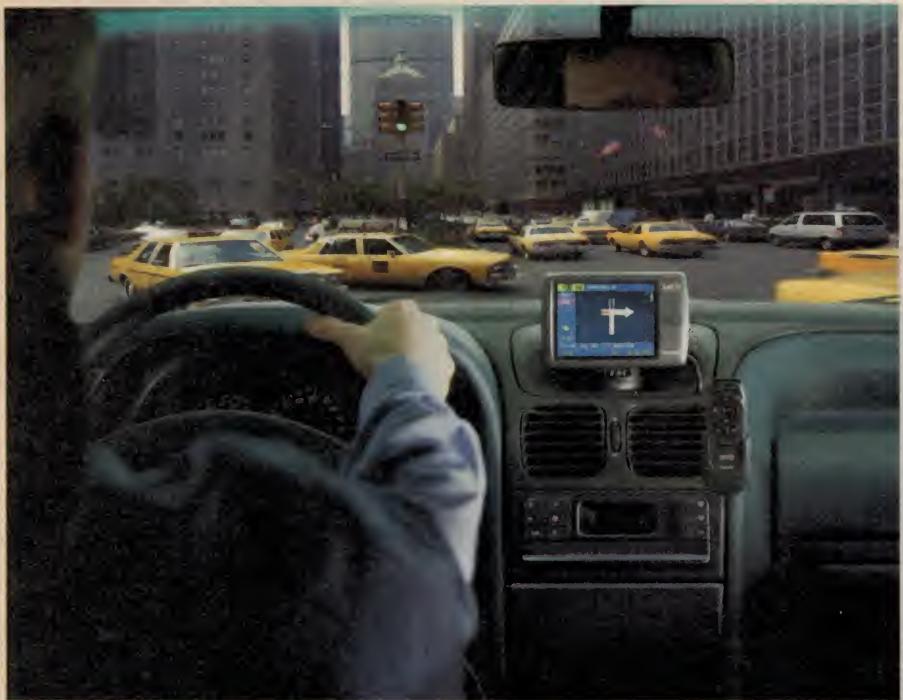
The program has a number of other attributes, not least of which are its incorporation of a 270,000 word lexicon (based on the Oxford University Press Dictionary) that can be further expanded by up to 64,000 additional words to suit your specific requirements. FreeSpeech 98 also supports most Windows applications, including Office 97 and Office 95 and other popular PC applications, like email!

IBM was also touting their ViaVoice speech recognition software, which they claim to be one of the most advanced speech to text technologies available on a PC. Unlike Philips who are marketing the software (and peripheral hardware) direct to the consumers, IBM market their software as an integral free software component with their latest Aptiva E3U (at US\$1099), E5U (at US\$1399) and E6U (at US\$1799) PCs. Whilst IBM were not demonstrating their ViaVoice technology, I have heard good reports, and am aware of a number of US firms having adopted it for commercial applications.

"One of the most exciting groups of new products was the speech recognition consumer products..."

The financial impediment seems to have been resolved by the combination of the latest generation of MMX computers with processor speeds exceeding 260MHz, and an exciting speech recognition software package from Philips Electronics North America. Philips FreeSpeech 98 is described as 'Continuous Speech Recognition Software'. With a selling price of US\$39, it has to be the most affordable speech recognition soft-

ware environment by communicating directly with the computer via the microphone, without unnatural pauses between words (a limitation with some prior programs). The dictation process is significantly enhanced by the integration of a patented, synchronous playback feature that enables the user to simultaneously highlight the selection, allowing rapid and easy text and proof reading changes. Words can be replaced by choos-



Gone even further

Philips has actually taken their speech recognition and automated speech software even further than I would have thought. I had the good fortune to take a spin in a current top-of-the-line 750iL BMW sedans, equipped with an advanced GSM-controlled car navigation system. Unlike previous generations of dashboard-mounted navigation systems that required the driver to make reference to his or her video screen, the latest generation of Philips Carin 440 and Visteon provide hands-free, vision-free, automated verbal instructions. Visteon claims that its Voice Activated Control System is 'speaker independent', providing the ability to adapt to differences in vocal characteristics, as well as to multiple languages, with the further (unsubstantiated) claim of adapting to different dialects in those languages. The Philips Carin 440 (distributed by VDO Audio and Navigation) impressed me with its ability to provide precise turn-by-turn spoken directions, supported by LCD pictograms. It also provided superb AM and FM reception supplemented by the in-dash CD player. A DIN mounted four-disc CD changer or boot mounted 10-disc changer are two of the options available.

I was amazed by the Carin 440's accurate, timely verbal instructions as we approached various intersections on the route that it had mapped for us between a factory on the outskirts of San Diego and a downtown venue to which we were driving. The software provides the ability to select a route involving only major roads, or the most direct route, or alternative routes when stopped by obstruc-

tions or traffic gridlock. It also provides expected time of arrival data, based on your average travel speed up to that point. In the event of a holdup, it amends the ETA and takes into account the stoppage time.

Our path from the factory to downtown San Diego involved multiple changes of direction on different freeways and bypasses, during which the navigation system expertly instructed distances, the need to slow down and take care. It proved to be far better and far less annoying than any previous 'back-seat driver' (or human navigator) with whom I have been associated.

I was particularly impressed by the accuracy

The Philips Carin 440 GSM-controlled car navigation system in a demo vehicle — "gives accurate and timely verbal instructions".

of the distances nominated by the computer-generated voice, whose accuracy always appeared to be within +/-10 feet. The software provided by Navigation Technology covers all America in seven CD-ROM discs, with particularly accurate information on most major cities. The software provides the location of hotels, fast food outlets, libraries, schools, fire and police stations, and other important public services.

Following my return to Sydney I discovered that Avis have recently fitted the Avis Navigator, which is the Australian version of the Philips Carin Navigation System, to their top-of-the-line sedans. Whilst I had doubted the availability of appropriate software, it appears that the GSM data and software is currently available for Sydney, Melbourne, Brisbane and Canberra.

Avis offered me a car fitted with the Avis Navigator to facilitate its evaluation. The system proved to be nearly as good as the American system I had evaluated. Whilst lacking some of the refinements of the BMW on-board navigator, it performed reasonably well nonetheless. My only complaint was it tried to inappropriately direct me into some one-way streets near my office. Fortunately, I was aware of the false information and ignored the instructions. Had I not been aware, the journey would have been far more eventful!

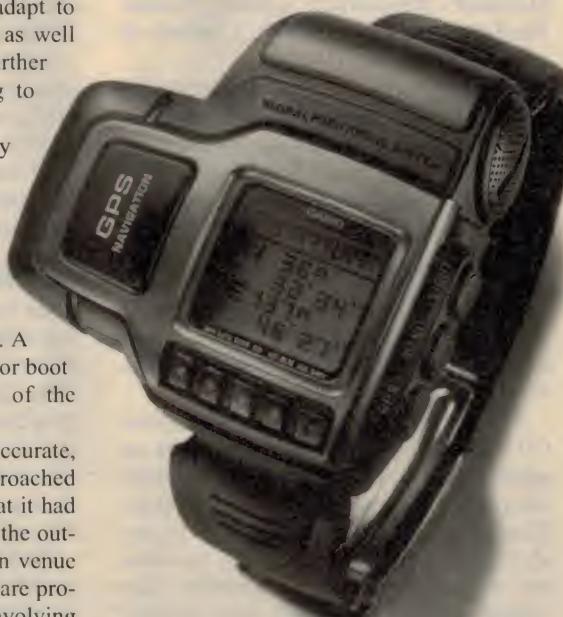
I suggest that if you hire an Avis car in a major Australian city, you should seriously consider a hire car fitted with the Avis Navigator. You will then discover just how convenient a Carin Navigation System can be.

Watch with GPS

Whilst we're on the subject of navigation systems, Casio announced the introduction of the world's first watch with built-in global positioning system (GPS). Although Casio claims that its wrist-worn 'watch' is 60% lighter (at only 5.22oz) and smaller than other GPS navigation devices, it still seemed awfully large to me.

Casio have used some very fancy multi-layer construction methods to minimise electrical circuit noise, whilst still maintaining the extremely high sensitivities required to pick up the GPS satellite transmissions. By using a standard 3V lithium battery the GPS watch is capable of providing 600 single readings, or up to 10 hours of continuous automatic monitoring during which the read-out is updated once per minute. If you need a reading in a hurry it can be computed in 4 seconds — which is pretty fast.

One desirable feature of the Casio GPS watch is its ability to recall the location of the individual GPS readings so that you can



Casio released the world's first watch with built-in GPS navigation.

re-trace up to 200 points along your route for subsequent mapping (or up to 100 points of continuous route data).

Taking orders...

Visteon claim that their latest generation of Voice Activated Control System will allow you to set key controls, dial telephone numbers with instructions like:

"Phone, dial 018 962197." And it does. Or instruct it: "CD, play disc 3, track 7." And it does! I saw a demonstration of the Visteon hardware, which impressed me with their system's user-friendly flexibility.

Fujitsu Ten was planning to introduce their Eclipse Commander Voice Controlled Vehicle Integration System in April. The Eclipse Commander also uses speech recognition technology as the primary or preferred means for entering all control commands without recourse to a keyboard or joystick.

The Eclipse Commander is intended to ensure that the driver's hands are on the wheel and eyes on the road. It also incorporates a GPS navigation system that similarly uses voice prompts and a turn-by-turn display to guide the driver and his vehicle to their destination.

All the user has to do is insert a regional map CD-ROM and the Commander then determines the destination through a series of brief questions. Once the user verifies the route, he or she can then listen to a CD, or to AM/FM radio, which the Eclipse Commander will then interrupt with directions, or cautions should the driver deviate from the pre-determined route. The system is also capable of integrating most portable cellular telephones, by means of a portable phone cellular kit. It can then access telephone numbers in its memory, dial telephone numbers, re-dial when requested, as well as answer incoming calls, all under voice command.

Let there be light!

There were further variations on this technology theme on display, including Voice Signal's Lamp Commander, which is a voice-controlled on/off/dimmer control for lamps. The attributes of this system are its claimed ability to work with any voice, work with any lamp and its ability to work at distances of up to 10m with simple voice commands.

Voice Signal also had a VSDialer, which provides conventional phone, wireless phones and fax machines with the ability to recognise continuously spoken digits as well as names. The Voice Signal system uses a 4KB ROM and one or two 10KB RAMs (depending on the vocabulary size), which are then embedded in the specific hardware to accept the instructions and rapidly implement VSDialer.

The VSTalk software is based on the continuous Hidden Markov Model (HMM),

thereby facilitating the entire range of speech tasks from the simplest discrete command recognition through to fully continuous speech recognition. The dissemination of this class of software has impressive implications when applied to the requirements of the physically impaired — and most particularly for the blind, who have patiently waited for many years for the development of such a technology.

Compactflash cards provides a convenient means of adding memory, or access to hardware accessories. I also appreciated its integration of a simple voice command capability that allows the owner to select music, or retrieve contact information without taking one's eyes off the road.

The AutoPC's integration of speech synthesis technology provides the driver with read-out (spoken) output of the displayed



Clarion's 'AutoPC', an integrated control and entertainment system which runs under Windows CE.

Car computer

Clarion unveiled what they claimed to be the world's first 'AutoPC' powered by Microsoft's Windows CE operating system. The Clarion AutoPC exhibits a number of interesting features.

If we ignore your potential need for a computer in the car, the primary attribute of this system is that it integrated car audio, computing functions, navigation and wireless communications through a hands-free voice activated system using a single-DIN-depth unit in the car's dashboard. The AutoPC is a high-powered AM/FM stereo with integrated signal processing and four 35-watt channel amplifiers. It incorporates Window CE running on an Hitachi SH3 processor with 16MB DRAM and 8MB of ROM.

The unit boasts the first in-dash Clarion CD Audio/CD-ROM drive, supported by an optional six-disc CD changer interconnected via a Universal Serial Bus (USB). The backlit eight-colour LCD screen provides an easily read, icon-driven user interface. An infrared data port on the facia provides easy information exchange to and from other PC companion devices, when required.

The incorporation of built-in support for

text, when coupled to map data from the Navigation Technologies GPS system. The AutoPC can provide automatic starting point identification, as well as pinpoint the vehicle's exact location.

On the second day of the CES, Clarion announced its intention of incorporating IBM's new microdrive in future versions of the Clarion AutoPC. Now that announcement was revolutionary, as the IBM microdrive is the world's smallest and lightest hard disc drive, with an astounding 340MB capacity.

Tiny hard drive

When I saw (or more pointedly handled) my first example of an unmounted microdrive, I blinked with disbelief. I had clear memories of the size and weight of the first 20MB hard drive that I had purchased, just over 10 years ago. Its dimensions were somewhat larger than half a shoebox, and the comparison of its size and capacity with that of the new IBM microdrive was disconcerting.

The IBM microdrive has dimensions comparable with my wristwatch, and more pointedly it's even thinner. Its power demands and size are so minuscule that it is a 'shoe-in' for a multiplicity of other exciting applications.

IBM's new microdrive can be used to store images taken by Canon's latest digital camera.

While I was at the CES it was announced that it has already been selected as an alternative data bank for Canon's latest digital camera. I have since been advised that it is now slated for at least three different models of the next generation of portable computers. More importantly, it will allow the size of handheld computers to be further reduced, along with their insatiable power demands.

A new 96MB compact flashcard was also on show, which was only marginally larger than the IBM microdrive. The compact flashcard is also a 'shoe-in' for the next generation of digital cameras, as well as for most portable and many hand-held computers.

Whilst we're talking about memories, Sony were exhibiting their latest Memory Stick, which is currently available in an 8MB version with modules up to 64MB about to be released. The attractive feature of the memory stick is its minuscule dimensions — comparable to half a stick of chewing gum, and certainly no thicker.

The Sony Memory Stick has been designed to augment Sony's personal video product range, so that you can download the video data collected or recorded and conveniently re-insert it into a separate device to record, display or print it.

Novel parking aid

As you probably realise, Americans display various fetishes and foibles when it comes to their cars. It seems that they are no different to us, though, when it comes to parking cars in their garages. However whereas you or I might have been satisfied with an old tyre on the end wall to ensure that we neither demolish the car nor the garage wall, the Americans have opted for a hi-tech solution.

Their approach has been to adopt solutions like Exeter Technologies Ultrasonic warning system, called Park-Zone. This easily installed two-piece unit provides the driver with a visual warning as their vehicle approaches objects or obstacles

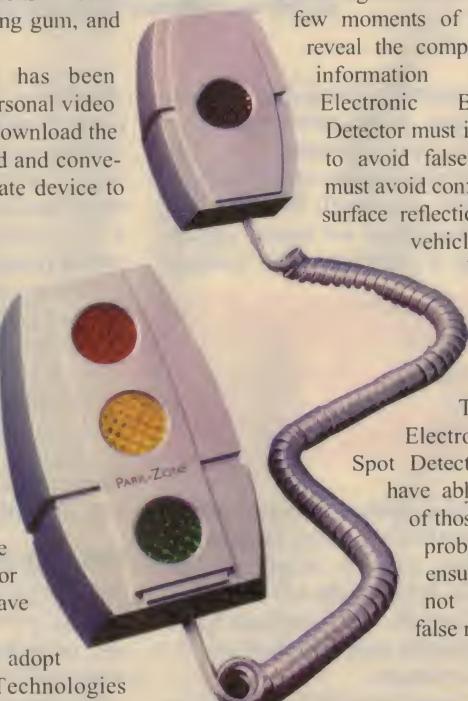


against the back wall of the garage. The operating range is 150mm to

5m, and the Park-Zone precision parking device avoids what they describe as potentially being 'thousands of dollars in car or property damage'. The green, yellow and red lights indicate your vehicle's presence in the garage, your approach to the final position and when you have reached that limiting position, respectively.

A more innovative product was the Alirt Industries Electronic Blind Spot Detector, which detects the presence of another vehicle in your blind spot and provides the driver with appropriate warning before changing lanes.

Although the concept may appear simple and straightforward at first sight, a few moments of thought will reveal the complexity of the information that the Electronic Blind Spot Detector must interpret so as to avoid false readings. It must avoid confusion of road surface reflections, rain and vehicles parked beside the road beyond the intended range. The Alirt Electronic Blind Spot Detector seems to have ably resolved all of those prospective problems to ensure that it does not provide any false readings.



Exeter Technologies' Park-Zone is an ultrasonic sensor to allow safer parking in your garage.

Bone tone phone

Although in a completely different category to most of the other products I examined, the Mirafone OP201 immediately attracted my attention. Here was a revolutionary phone initially designed to assist the hard of hearing, which simultaneously displays unparalleled advantages when used in extremely noisy environments.

The Mirafone uses an unconventional bone conduction transducer in place of the normal acoustical transducer on the handset, to transmit vibration signals directly into the side of the user's head. This ensures optimum signal communication, even in those situations where the user has a significant physical impairment as



The Mirafone OP201 phone, which uses bone conduction to allow communication in noisy environments — or for the hearing impaired.

typified by inner ear infections or malfunction, or even significant cochlear impairment. In noisy environments, even when wearing earplugs or earmuffs, a user is able to communicate with unparalleled ease unencumbered by the normal need to remove the hearing protection device that is occluding his or her ear canal.

With a bit of luck, I'll be in a position to conduct a full review the Mirafone OP201 later this year so that I can assess its performance with subjects suffering from moderate and severe deafness, as well as with subjects when exposed to elevated noise levels.

Emergency comms

There was another class of telephone and paging devices that attracted a lot of effort and attention at the CES. Here the effort and interest was focussed on emergency messages and security for drivers. With the death of Bill Cosby's son clearly in their memories, many firms have decided to market a product to placate either parental or partner worries that their children or partners should be able to summon help

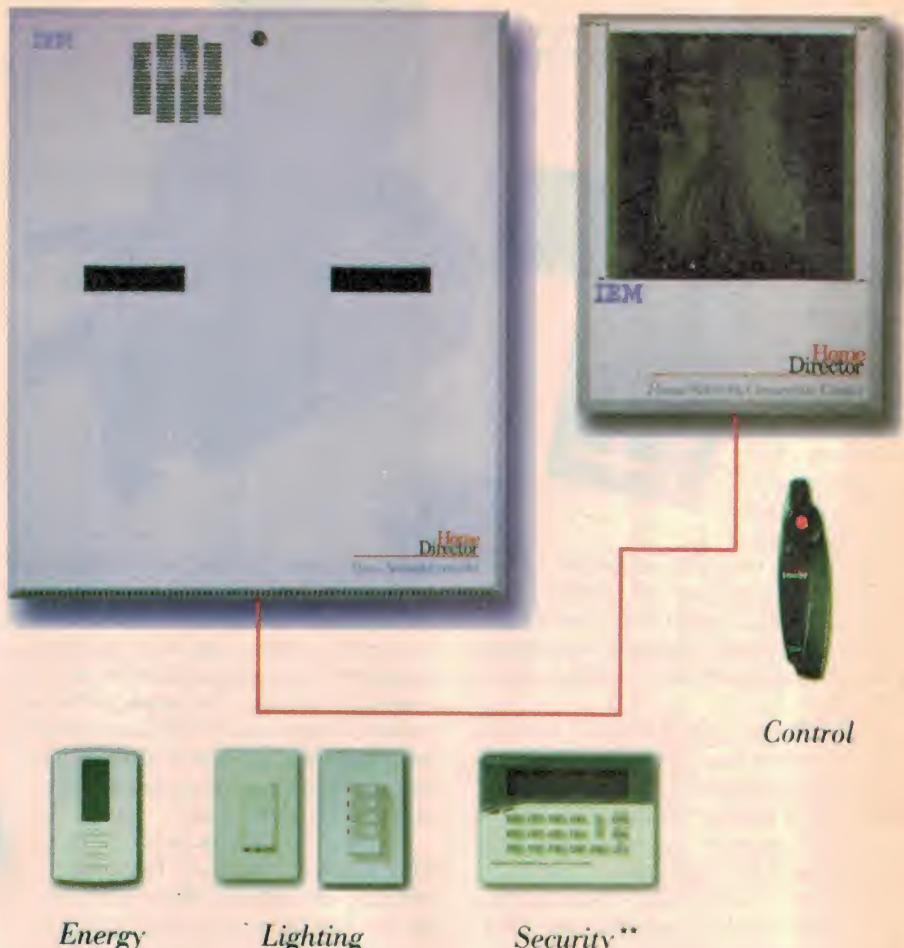
when needed.

The approaches taken by different firms are both many and varied, as you may imagine, and the number of permutations and combinations offered was truly astounding. For example Visteon Vehicle Emergency Messaging System claims that: 'Visteon's VEMS will allow drivers to get help 24 hours a day with the touch of an 'SOS' button'.

Visteon's VEMS uses GPS coupled with the cellular telephone network to summon police, fire or medical attention to cope with any roadside emergency — providing what the manufacturers refer to as 'complete peace of mind when on the road'. The system relies on the operator to contact the appropriate emergency service and to maintain voice contact until help arrives. An unusual feature that can be activated when required, enables the VEMS to lock the vehicle's doors, which may then only be unlocked remotely by the emergency operator.

Other firms are offering single-button emergency distress systems. Alpine are offering Mobile Mayday Telematics, while Motorola Telematics are providing similar BMW Mayday systems in the latest cellular phone equipped BMW sedans being sold in America. Each of these services involves an installation cost of US\$1000 - 1200, supplemented by a monthly service fee of US\$20.

The mobile mayday system's safety features include two-way voice and data communication with a response centre in which 'skilled emergency communication specialists' deal with your medical and other safety-related problems. Most systems provide a hidden (silent) panic button, roadside assistance, tracking of stolen cars and even the ability to unlock your vehicle if the keys are locked inside (but that service involves



IBM's new Home Director home networking system can reticulate audio, video and data as well as implement appliance control and 'home automation'.

IBM has started delivering its new 'Home Director' home networking solution, which provides a complete home network, or TV/entertainment system control via a PC (IBM, of course). The IBM system claims that it does not require special hardware, as it integrates with existing

security or monitoring cameras and systems, as well as most of the more prosaic entertainment system functions. The primary functional controls and displays either feed into an existing computer or to a TV screen on which the various controlled functions are displayed. The primary circuits are controlled by low voltage wiring supplemented by coaxial circuits, as and where required.

It was interesting to note that the functions offered by the new IBM system appear to replicate many of the features of HPM's recently released 'Oscar' home automation system, developed for the Australian and New Zealand markets.

Battery developments

The last group of products that I wish to discuss are the new developments in battery technology, which proved to be both many and varied.

The first display I came to made me sit up with a start: Maxell Energy Products Group released a series of replacement nickel-metal hydride (NiMH) camcorder

an additional cost for its integration and application).

Home automation

Home automation has suddenly become a burgeoning market in the USA and Europe. The American systems still tend to treat control of hi-fi systems (as exemplified by the Niles systems) or home security and safety as the dominant issues, as typified by IBM's entry into the market.

security, lighting, heating, air conditioning, network-enabled PCs and their peripherals. IBM's brochure, however, reveals that the Home Director does require a wall-mounted computer module, and a separate home network connection centre in which all relevant cables terminate.

The Home Director will turn lights on or off (when required or at preset times), arm or disarm security systems, control heating, cooling, cooking, multiple TV sets, CCTV

batteries to replace the standard nickel cadmium batteries which have created so many headaches because of their intractable 'memory' problems.

The Maxell range of NiMH batteries is available to suit virtually every brand of 8mm and VHS-C camcorder marketed over the last 10 years. More significantly, their capacious 4000mAh rating ensures that you can go out into the field and record for periods of at least two, and for potentially as long as three hours, before your battery needs substitution or a recharge.

Duracell North Atlantic Group are also marketing a similar range of products, as both firms expressed the view that the market is 'ripe for the plucking'. Hopefully, we'll see the Maxell and Duracell products in Australasia and New Zealand in the near future.

Maxell are now also marketing an exciting new range of lithium ion and NiMH batteries with cigarette lighter adaptors to suit the most popular Motorola, Ericsson and Nokia digital and analog mobile phones. It's interesting to note the analog phones have not been phased out in America, as they still provide outstanding service, particularly in difficult rural service areas.

Sanyo announced the introduction of its advanced rechargeable Cobalt Power battery system, with a claimed 50% higher power density and capacity when compared with conventional nickel cadmium batteries. Although I asked, nobody on the Sanyo stand was prepared to state positively that the Cobalt Power batteries would not ultimately exhibit memory problems, similar to those that have discouraged us with their intractability in the more conventional nickel cadmium batteries.

Rechargeable alkalines

Lenmar Enterprises announced a dramatic advance in rechargeable alkaline technology, with a range of new batteries that are claimed to offer 30% better performance than that of their nearest competitors. Although their claim was impressive, I suspected that they had not compared their product with Philips' range of advanced manganese batteries.

One of the most attractive features of the new Lenmar batteries is their ability to retain 80% of their energy capacity for up to five years. They also provide 2.5 times the service hours of a comparably-rated nickel cadmium battery, with either more, or guaranteed equal 'service hours' over the first 25 deep (full) discharge cycles. The Lenmar batteries are marketed with a plug-in charger that is suitable for two or four AA or AAA batteries. The cost of a set of batteries and charger seems to be quite attractive.

Last, but by no means least on the battery scene were a range of Electric Fuel's Zinc-Air (www.electric-fuel.com) disposable electric fuel cell batteries. The batteries on display were aimed at the mobile telephone market to satisfy emergency requirements, as typified by the demands of boats, campervans and other critical applications. These batteries have ratings in the range 2900 to 4500mAh, and are designed to provide continuous uninterrupted power for a mobile telephone for periods of between four and seven days, with extended intermittent power for up to 30 days.

A Zinc-Air battery's main attribute is its ability to maintain 100% of its initial power capacity until such time as its plastic cover is removed. When you unzip the plastic cover, air makes contact with the fuel cells to activate the battery.

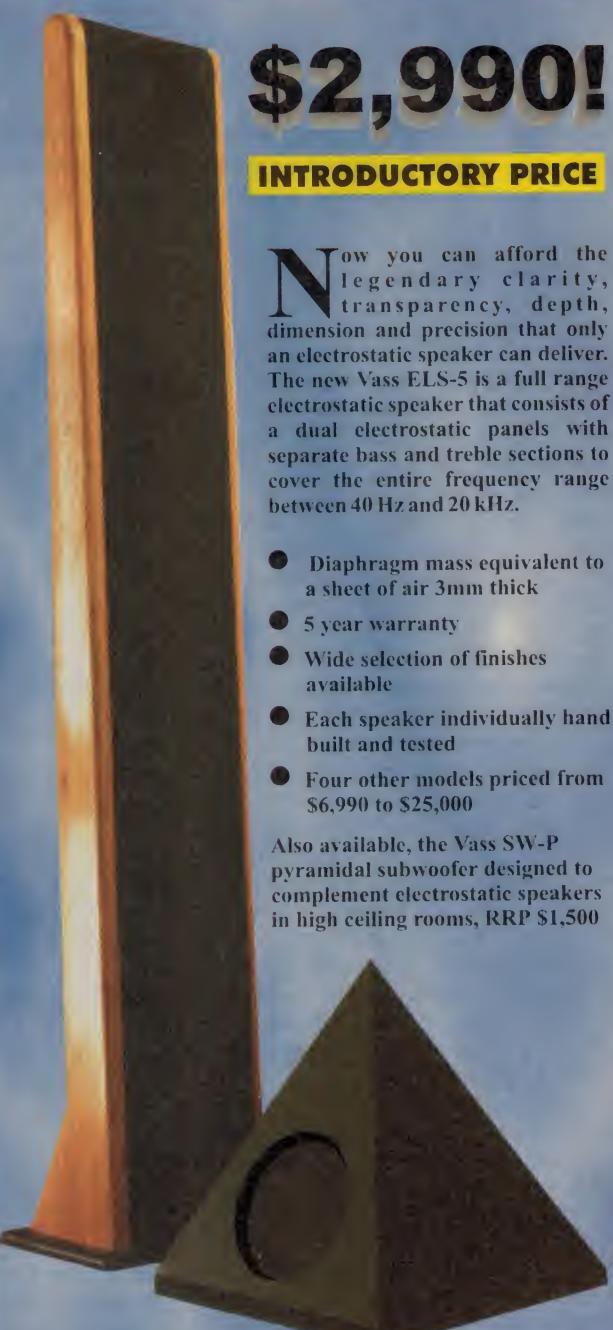
The only limitation or liability with a Zinc-Air fuel battery is that once it's uncovered the fuel cell degeneration process is initiated, and the battery's effective life thereafter is limited to about 30 days (whether you use its power or not!).

Zinc-Air batteries have obvious and unprecedented applications as a stand-by emergency telephone power source. The mobile telephone application is just one of many that I can envisage, though. You would want to have such a battery in your car, boat or plane, capable of providing maximum long-term power to cater for an unexpected contingency situation. ♦

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Pioneer's PDV-LC01 Mini DVD Player

We've seen personal tape players, personal CD players and more recently a personal MP3 music player — why not a personal DVD movie player? They're on the way, folks, and here's a quick look at a preview sample of a player that Pioneer is looking at releasing later this year.

by Jim Rowe

AFTER A FRUSTRATINGLY long lead-up, DVD finally seems to be taking off this year. Component-type players are now available from most of the big-name manufacturers, and even the software has begun trickling out.

Now that the technology has stabilised, perhaps it's not surprising that the hardware manufacturers are turning their attention to making 'personal portable' versions of the players. Matsushita/Panasonic has already been selling one unit in Japan, the DVD-L10, and were planning to release their new DVD-L50 on the domestic and North American markets in March and April.

It would seem that Pioneer may have similar plans, because a few weeks ago we had the opportunity to try out a preview sample of its new portable player, the PDV-LC01. This is a model manufactured for the Japanese domestic market, and the local Pioneer people say that at this stage it isn't entirely clear whether it will end up being sold in Australia. However it's probably similar to the units they may well end up selling here later in the year, so we jumped at the chance to put it through its paces on your behalf.

I guess my first impression was that the PDV-LC01 was smaller than I expected. Somehow I expected it to be about the size of a typical laptop PC, whereas in reality it's much smaller: only 158 x 160 x 43mm with the lid folded down, or little larger than a personal CD player. (Incidentally it *does* play CDs as well...) It really is a cute little baby, weighing only about 950g.

Flip up the lid, though, and it soon becomes clear that the PDV-LC01 is surprisingly practical. Inside that 13mm-thick lid is a backlit 125 x 72mm colour TFT-LCD screen, capable of displaying DVD widescreen video in very acceptable resolution for personal viewing — together with two very tiny (about 25mm) speakers. While the latter may not be capable



of producing 'big' surround sound, they're again quite practical for personal viewing.

Along the lower edge of the lid are three controls associated with the display: brightness and colour controls, plus a button which cycles through four display options (Normal/Full/Zoom/Off). The 'Off' option can be selected when you're using the player in conjunction with an external CTV/video monitor and audio system.

The DVD player itself is of course inside the

main body, with disc loading and unloading via a second flip-up lid. Inside it looks very similar to a personal CD player, as you'd expect.

Along the front edge there's the usual disc transport controls: Play, Stop, Pause, Fast Forward and Fast Reverse, plus a small alphanumerical LCD panel for status information. Then at front left on the top surface of the body, next to the deck opening button, there are four controls used for disc and menu navigation: Menu, Title and Return



Left: The controls and connections along the side of the player, including the 9V DC power input. Below you can see the rear, with the S-Video output connector and multi-purpose 3.5mm jacks. As well as serving as either outputs or inputs, as controlled by the slide switch, the audio jack is also an optical bitstream output.

buttons, plus a larger Enter button which also serves as a four-axis mini joystick.

There's a small red IR sensing window in the front of the body, because the player has its own remote control. The remote is actually quite elaborate, similar in size and with much the same functions as those provided with most component DVD players.

Along the left-hand side of the player, there's the Power On/Off switch, the audio volume control and a socket for stereo headphones. There's also a power input socket, indicating that the PDV-LC01 operates from 9V DC. The sample unit came with a small mains power supply, and this is apparently supplied as standard; however from the manual (all in Japanese) it looks as if a battery pack is available as an option. This seems to clip onto the rear of the case, with a flying lead and plug attaching to the 9V DC input.

At the rear of the case, in between the slots used to attach the battery pack, are the various audio and video connectors. First of all there's a standard four-pin mini DIN connector, which delivers S-Video so that the PDV-LC01 can be used to feed high quality video to a CTV or monitor, as a standard DVD player. Then there are two 3.5mm sockets, which superficially look quite standard — but here the Pioneer designers have been particularly ingenious, because the two can actually perform a total of five functions, partly under the control of a small slider switch.

With the switch in the 'Out' position, the (mono) Video socket provides standard composite video, while the (stereo) Audio socket can provide two-channel Dolby mix-down audio to drive an external stereo amplifier or 'analog' surround sound decoder. So in this position, the PDV-LC01 can again be used as a standard component DVD player driving a home theatre system.

In fact if you have an amplifier system capable of decoding full Dolby Digital optical bitstream output, that's also available — from the Audio connector. That's because as well as a standard 3.5mm stereo socket, it's also an optical output. Plug in a special 3.5mm optical connector, and you can drive an external decoder for full digital surround sound...

That's three of the five functions, then. The remaining two are achieved by moving the switch to the 'In' position, whereupon the two 3.5mm connectors become composite video and audio inputs. So in this mode



the PDV-LC01 effectively becomes a compact widescreen video monitor, complete with stereo audio facilities. It would be very nice for displaying a recording directly from a camcorder, for example.

Trying it out

The sample player didn't come with a battery pack and its power pack was clearly designed to operate from 115V AC, so we had to try it out using a mains stepdown transformer. Similarly as a unit made for the domestic Japanese market it was coded to play only Region 2 discs, so we couldn't test it with locally available software. However Pioneer kindly loaned us a special Region 2 demo disc, featuring a variety of sample and demonstration tracks.

Using this disc the PDV-LC01 gave a very good account of itself, delivering bright and clear images on the built-in screen, with a resolution quite adequate for personal viewing. Not surprisingly the sound from the tiny inbuilt speakers was a bit lacking in bass, but again adequate for personal viewing.

On the other hand feeding the player's video and audio out to an external CTV gave even better performance, especially when the S-Video output was used and the two-channel audio fed to a Pro-Logic surround decoder. In fact the results were then very comparable to those we've seen from 'component' DVD players, showing that the PDV-LC01 is no slouch in terms of its basic player functions.

Actually we had the Sony VPL-SC50M video projector available at the time of these tests, and were able to feed the video out to it as well, to see the picture quality 'writ large'. Again there was no need for apologies, as the

image was very satisfying indeed.

In short, then, and despite its tiny package Pioneer's PDV-LC01 portable DVD player seems an excellent performer, not only as a personal video player but also as either a very compact video monitor or a standard component DVD player for a larger system. If these or a similar model do get released here later in the year, they should therefore have a lot of potential appeal.

Our only real quibble is that they're likely to be a bit beyond the reach of most private users, with an anticipated RRP of about \$3000. But presumably a major cost component is the LCD screen, so we can always hope that the cost of these will keep falling and make this kind of product more affordable too. ♦

Pioneer PDV-LC01

Preview sample of the coming breed of 'personal portable' DVD video players.

Good points: Good picture, acceptable sound, also able to function as a component DVD player (complete with remote control) driving a larger AV system. Provides both S-Video and optical bitstream audio outputs, as well as composite video/analog audio outputs and inputs.

Bad points: Price seems rather high, especially when battery pack is apparently an optional extra. Inbuilt speakers don't provide much bass.

RRP: Expected to be around \$3000.

Available: No, but a similar model may be available here later in the year. Keep an eye on Pioneer dealers, or contact Pioneer Electronics Australia, 178-184 Boundary Road, Braeside 3195.

JVC's GR-DVF10

Digital Camcorder

Perhaps the Japanese electronics industry has learnt from its recent experiences with small format digital video. Maybe the main lesson absorbed is that, in a volatile market environment, consortia rarely work! With its new GS-DVF10 Cybercam JVC has provided a DV format digital camcorder for below \$2000...

by Barrie Smith

LATE 1995 SAW the announcement of a consumer digital video format, Mini DV, using 6.35mm (1/4") tape. Companies agreeing to the standard were Sony, Philips, Thomson, Matsushita, Hitachi, Toshiba, Sharp, Mitsubishi, Sanyo and JVC. Many were amazed to see so many companies, mostly Japanese, in agreement over a standard that could be a market 'volatile'.

The hope was that the public would gravitate from analog (8mm/Hi8/VHS) to digital; consumers would enjoy the benefits of the new technology while the companies could look forward to growing profits.

Of course it didn't happen that way; Mini DV has captured only 5% of the world market — most likely because of high introductory prices, still around \$4000 and up. So now, four years down the track, we see a split in the initial consortium as Sony invents its own Digital 8 standard (backwards compatible with Hi8, using 8mm tape), and JVC enters its new Mini DV camcorder, the GR-DVF10 covered in this review.

And, surprise, surprise, you can expect to be able to buy a Sony Digital 8 camera for around \$2000, while the new JVC is only \$1995. Now why didn't they introduce Mini DV at the right price in the first place, you ask? Good question — but there's no good answer.

Step away

The new JVC GR-DVF10 Cybercam is a far step from recent Mini DV models. For one



thing it is large, at 99 x 119 x 198mm (WxHxD) and comparatively heavy, at 800g. Recent, but higher priced, models from Sony, JVC and Panasonic have been much smaller and lighter, enabling them to be stowed in a jacket pocket or handbag. Being biggish, some people may find long stretches of handholding the JVC camcorder tiring.

The layout of external controls is well co-ordinated, but most fine tuning of operational modes and access to special effects is made via the viewfinder menu.

The camera may have been budget priced, but in typical Japanese fashion it presents a

choice of two channel (16-bit linear, 48kHz sampling) or four channel (12-bit nonlinear, 32kHz sampling) quality.

The camera offers two LCD viewfinders — one a 0.55" turret viewer, the other a fold-out door 2.5" job, with 110,000 pixels. With the former you can view the scene effortlessly even in bright light. The fold-out LCD finder enables marvellous handheld shooting, with the camera extended at arm's length; the screen can be pivoted so that the subject can view themselves while shooting, or the operator can hold camera above the head to shoot over crowds. The LCD screen is accompanied by a rear-mounted, small but usable confidence speaker.

The zoom is a 16x optical setup, zooming from 3.9mm to 62.4mm. Because the 3.9mm wide end focal length images to a 1/4" CCD you will find it is not a great help when shooting interiors, but the telephoto end of the lens can pull in a useful head and shoulders shot from a 10 metres distance. Full-length shots of sporting figures from the sidelines are also achievable.

Possibly in accordance with marketing ploys, most camcorders now sport digital zooming — in the case of the CyberCam this reaches out to 160x. In practice you will find that up to around 30x is usable and viewable on a TV screen, but beyond this degree of magnification the visible pixillation gives the game away. JVC has used a technology called Spline Interpolation, which they claim

Basic specs

Recording format: DV (SD mode), PAL.
Tape speeds: SP 18.8mm/sec;
12.5mm/sec.
CCD: 1/4 inch.
Lens: f1.6/3.9-62.4mm.
Filter thread: 40.5mm.
Dimensions: 99 x 119 x 198mm (WHD).
Weight: 800g approx.

myriad of features — some of which are highly useful, others not so.

With the DV format you do get to shoot digital with picture and sound well above analog in quality, with a promised 500 lines of horizontal resolution, extended colour space and 16-bit PCM digital stereo audio, in a

'smoothes image contours and minimises jagged edges'; it does help to minimise the pixillation, as the individual pixels mutate to fuzzy visual noise.

A major aid to shooting at long focal lengths is the camera's image stabiliser, which works most effectively. Although an electronic device, there is no apparent image loss. Be aware that camera shake is the main bugbear of the raw and inexperienced video camera person, so a 1990s video camera needs every steady device it can use!

Digital effects

Again, following current practice, the camcorder is packed full of digital effects and scene transitions that can, in the right hands, add a professional 'feel' to home videos. These effects include monochrome, sepia, classic film, strobe, cinema, twilight, slow shutter and hi-speed shutter. Effects such as the slow shutter modes can take exposure levels down to as low as 1/12.5th and 1/5th of a second — useful for extra dark scenes or candle lit subjects. Of course the payoff is that movement is blurred, due to slow CCD scanning rates.

Welcomed by many video fans will be the extraordinary array of digital scene transitions. With such wipes as mosaic fader, shutter wipe, slide wipe, door wipe, corner wipe, window wipe and dissolve, you can now populate your production with as many eye-tearing fancy scene changes as your heart wishes.

Fundamental editing can also be performed with the CyberCam, thanks to EasyEdit random assemble editing, in which up to eight scenes can be automatically selected and collated, then transferred to a compatible video deck. Instructions are given on using the supplied remote control to issue control codes to a number of mainstream VCRs, so camera and VCR can work in concert during editing/dubbing. In playback, a number of effects can also be inserted — such as a digital zoom up to 10x, mono, strobe, classic film and sepia.

The camera offers a snap shot mode, allowing operators to freeze a scene, add a white border or drop shadow to the shot, as well as presenting a choice of four- and nine-frame modes to pepper the screen with multi images. A



With the viewfinder door opened, the 2.5" LCD screen is revealed along with the lid of the tape loading bay. Note the small speaker over near the turret finder.

Above shows the tape loading bay opened, to insert or remove a DV tape cartridge. At left is the compact 'front end', with 16x zoom lens, fill light and stereo mic.

motor drive function allows serial snapshots to be shot at intervals of 0.7 second.

By the way, there's also an onboard light. This, we feel, will mightily please many home video shooters. Mind you at 3W it is no flamethrower, but the diffused lamp cover helps dissipate illumination hot spot when shooting close to a subject. In use, the light was found to be a very handy fill light — useful as a boost for situations where there is a little ambient light already present. It won't get you far in zero light situations, but at least you have the option of setting it fully off, at auto (when it will

light up when in dark areas), or fully on.

The matter of white balance comes into play when

artificial light is used, as the onboard light delivers a colour temperature of approximately 3200K. Thankfully the JVC CyberCam addresses this problem with a simple method of manually balancing to a white card in the shooting situation. Three presets are available, as well as auto: full sun, cloudy sky and tungsten.

Other camera functions can be set manually: focus and exposure are two.

In normal auto mode, focus is achieved down to as close as 15mm from the lens at the wide angle setting; manual focus can secure a specific focus point. In accessing manual exposure, an estimated compensation range of two stops up and down (in third-stop steps) can be set.

Slim remote

At roughly the same size as a business card, the camera's remote control is packed with control points. The camera, its zoom, access to digital effects, fades/wipes and record and replay functions can all be driven from this tiny device.

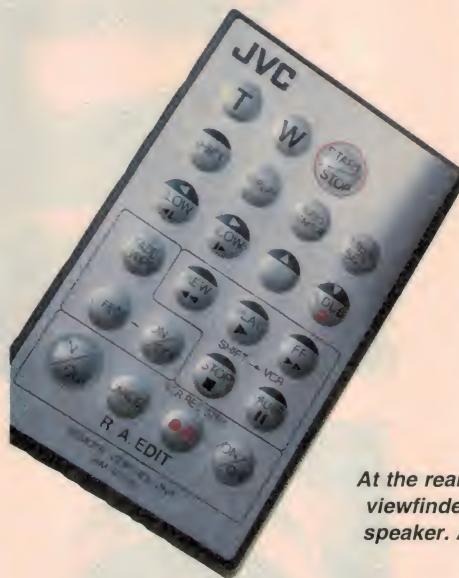
Summarising

We found the overall video and audio quality of the GR-DVF10 camcorder to be up with current DV levels. The tiny onboard microphone does suffer though, both from its position and quality; discerning users will mostly use an external unit, connecting to the camera's external mic input.

One annoying feature of the camcorder was the record button. Having four detents — replay, off, record auto, record pro — it was near impossible to operate with the thumb of the right hand only; a two-fingered fumble was necessary most times.

Ostensibly, a \$2000 DV camcorder is a win for the video shooter. It's hard to argue with that proposition. Unfortunately, the downside is that whilst the camcorder can shoot DV, it cannot output DV, nor accept a DV signal input.

The camera's main signal output points are a composite video signal plus left and right analog audio. There's an S-video output too, but no digital output. Which means that the average Joe or Jill can shoot near broadcast quality images supported by two-channel, 16-bit linear 48kHz sampled audio. But he or she can replay it only to a composite or an S-video compatible TV or VCR deck.



At the rear, there are the controls for replay mode and viewfinder menu access — plus the small confidence speaker. At left is the busy remote control, which can 'talk' to VCRs for editing.

To extract the full benefit of digital — with no loss in generation-to-generation dubs — you need to replay your CyberCam shot DV tapes on a DV tape deck or camcorder. This seems most unfortunate.

Finally, the GR-DVF10 Cybercam comes with the following accessories: a multi-brand full function remote control, AC power adapter/charger, battery pack, shoulder strap, S-Video cable, AV cable, edit cable and a Mini DV cassette.

(Footnote: Barrie Smith will review the new Sony Digital 8/Hi8 hybrid digital/analog camera lineup in a forthcoming issue.) ♦

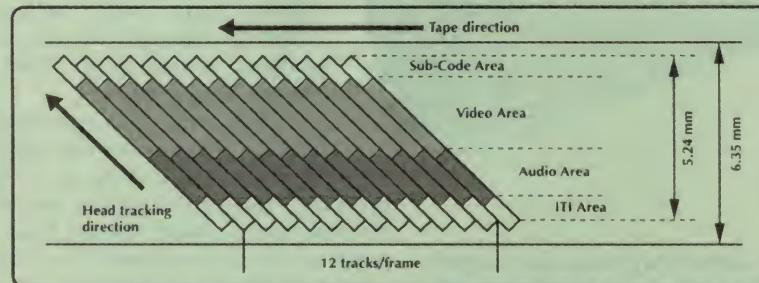
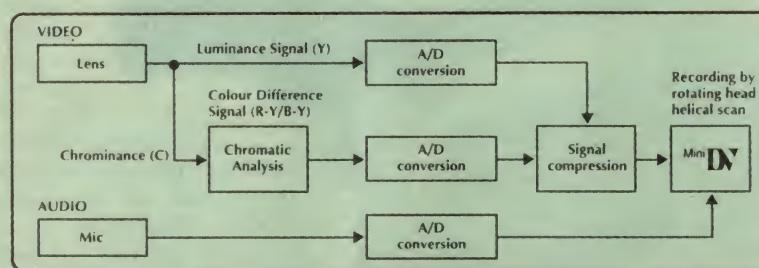
JVC GR-DVF10 Digital Camcorder

Good points: Digital video and audio capture at a much more attractive price.

Bad points: No digital video or audio outputs; record/replay button is user unfriendly.

RRP: \$1995.

Available: JVC dealers, or contact distributor Hegemeyer (A'sia), 104 Vanessa Street, Kingsgrove; (02) 9370 8888.



About DV

The digital camcorder converts incoming audio and video signals into digital form for recording.

A video signal is composed of a luminance signal (Y) and colour signals (R-Y and B-Y). These signals are identified and recorded digitally (Digital Component Recording). The A/D (analog to digital) converter samples the Y signal at 13.5MHz and the R-Y and B-Y signals at 6.75MHz, and changes them to an 8-bit quantum signal.

Sound sampled at 48kHz is changed to a 16-bit quantum signal, and sound sampled at 32kHz is converted to a 12-bit signal.

(Note that the data recorded on a DV tape is digital, but the output of this camcorder is analog.

** Sub-Code Area: The Time Code and Date/Time data are written here, separate from the video data. This enables you to display the date and time during playback, even if they weren't displayed while recording.*

** Video Area: The digital video signal is recorded here.*

** Audio Area: The digital audio signal is recorded here.*

** ITI (Insert and Tracking Information) Area: Insert editing and post-recording editing tracking signals are recorded here.*

MicroGram Computers

Internet Access Server



Internet for everyone! Give all stations on your network simultaneous access to the Internet through this pocket-sized access server. Hardware

based firewall ensures your security, while dial on demand minimizes your connect time. It has a built-in DHCP server & includes software to provide clients with their own email address. Provides one communication port (DB25) for Internet access and one RJ-45 port for connection to your 10Base-T Ethernet network. Supports easy Internet connection to your Internet Service Provider via modem or ISDN.

Cat. 10100 Internet Access Server 1 Port \$459
Cat. 10104 Internet Access Server 2 Port \$579

100Mbps Network Starter Kit

This kit has all the hardware components required to build a 100Mbps network for two PC's and includes a comprehensive installation manual.



All software is part of Win 95/98/NT. The 100Mbps Network Starter Kit provides the most cost-effective solution for users who desire fast throughput at the cost of traditional 10Mbps. The kit includes one 4 port 100Mbps Fast Ethernet hub, two 10/100Mbps PCI Fast Ethernet adapters, two 5 metre Cat. 5 network cables and software drivers for the adapters.

Cat. 11900 100Mbps Network Starter Kit \$339

10/100 Mbps Ethernet Hubs



Each individual port on these dual-speed hubs provide 10/100Mbps auto-negotiation function which automatically senses and selects the optimum speed of 10Mbps or 100Mbps.

Cat. 11310 10/100 BaseTX Ethernet Hub 5 Port \$345
Cat. 11299 10/100 BaseTX Ethernet Hub 8 Port \$639
Cat. 11298 10/100 BaseTX Ethernet Hub 16 Port \$999

10Mbps Ethernet 5 Port Hub & LAN Card

Internal PCI Plug & Play 5 Port hub and LAN card does not require external power supply. One port can be used as an uplink port for easy expansion, or used for hub connectivity at the server.

Cat. 11295 Ethernet Hub & LAN Card 5 Port UTP 10Mb \$109



10/100Mbps Ethernet Cards

Able to auto sense either 10Mbps or 100Mbps operation, this PnP PCI Ethernet card uses the Bus Master architecture to maximise throughput. Ideal for progressive upgrade of your network.

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100Mbps Ethernet 5 Port Hub Card



Mounts on the back plane of a computer but does not plug into a slot, it only connects to the power supply. No separate case & power supply means reduced costs, plus everything is kept

neat & tidy inside the computer.

Cat. 11294	Ethernet Hub Card 5 Port UTP 100Mbps	\$259
Cat. 11287	Ethernet Hub Card 5 Port UTP 10Mbps	\$89
Cat. 11297	100 BaseTX Ethernet Hub 4 Port	\$189
Cat. 11281	100 BaseTX Ethernet Hub 8 Port	\$539
Cat. 11311	100 BaseTX Ethernet Hub 16 Port	\$889

Enhanced Network Cable Tester

Tests a range of Modular cables including 10Base-T (Category 3-5), as well as AT&T 258A, EIA/TIA and Token Ring. Includes a remote terminator.

Cat. 11516 Enhanced Network Cable Tester \$129.



Two Port USB Card PCI



Provides 2 USB ports with a bandwidth up to 12Mb/s. Supports real time dynamic insertion and removal of up to 127 devices.

Cat. 2622 Two Port USB Card PCI \$109

USB to Parallel Converter

The USB to Parallel converter is a bridge that links the Universal Serial Bus (USB) interface with the traditional IEEE-1284 parallel interface.

Cat. 2685 USB to Parallel Converter \$89

Infra Red Serial Links

Connect via standard serial port for computers without a built-in IR port or directly to a motherboard with built-in IR port pin outs. A transfer rate of up to 115,200 bps is supported over 3.5 metres.

Cat. 8421	Infra Red Serial Link	\$147
Cat. 8518	Infra Red Motherboard Link	\$99



Removable Hard Drive Kits

Consists of a 5.25" mounting rack & a removable tray for 3.5" hard drives. A keylock prevents inadvertent or unauthorised removal.



Applications include:

- securing confidential data in a safe overnight
- providing off-site backups
- easy interchange of OS (eg DOS to Windows NT)

Cat. 6049	IDE Kit	\$111
Cat. 6048	SCSI Kit	\$121
Cat. 6200 / 6224	IDE Tray / Frame Only	\$70
Cat. 6201 / 6225	SCSI Tray / Frame Only	\$76
Cat. 6327	SCSI Fast Wide	\$169

VGA Monitor Splitters

Splitter modules enable up to 8 monitors to simultaneously share the information of a host computer. The ideal way of providing multiple displays in training rooms, airports, stock rooms, clubs, etc.

Cat. 3070	Two Output	\$269
Cat. 3055	Four Output	\$336
Cat. 3056	Eight Output	\$574

ISA Cards

A versatile multi-I/O card that supports 2 FDD, 2 HDD as well as two 16550 compatible serial ports, 1 ECP/EPP printer port and 1 games port.

Cat. 2055	Multi I/O Card ISA	\$55
An ISA VGA 16 bit graphics card with super-high resolution, 256-colour capability & fast screen redraw.		
Cat. 2223	VGA ISA 16 bit 1MB TR8900D	\$75

Year 2000 BIOS Card

Even Pentium motherboards are not immune to the Year 2000 bug! This Year 2000 BIOS Card solves the problem of progression from 1999 to 2000 as well as 21st century leap years. It is also double-buffered to take care of the Crouch-Echlin effect. "It worked well in fact, and the machine passed all the tests we threw at it." March 99 Electronics Australia magazine.

Cat. 3359	Year 2000 BIOS Card	\$129
E & OE All prices include sales tax		



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DSE Powers Ahead with Concept Stores

Encouraged by the very positive market response to its first three 'PowerHouse' concept stores, Dick Smith Electronics has now opened another of these stores — the third in Sydney's metropolitan area. It's located at the Homemaker Supa Centa in Moore Park, close to the prosperous eastern suburbs.

by Jim Rowe

A FEW WEEKS AGO, Dick Smith Electronics opened another of its new PowerHouse concept stores, just south-east of the Sydney CBD in Moore Park. The new store is the fourth they've opened, and joins the original PowerHouse in Bankstown (opened in August 1996) and its siblings in Penrith (NSW) and Carnegie (Victoria) — opened in September and October 1998 — as tangible evidence of the company's success in developing the concept.

DSE itself needs no introduction to *EA* readers, of course. Started by Dick and Pip Smith in Sydney's Artarmon nearly 31 years ago as a supplier of electronic components and kits, it has steadily expanded into a very large and successful chain with some 120 of its original stores scattered throughout Australia and New Zealand — plus another 61 authorised stockists and franchisees. For the last 15 years or so the company has been a wholly owned subsidiary of publicly owned retail giant Woolworths.



Over the years the original Dick Smith stores have evolved and expanded in terms of product range and market areas, of course. Nowadays many of these stores already stock a large range of consumer electronics products, such as personal computers, peripherals and software; telephones, answering machines and faxes; fixed, cordless and mobile phones; clocks, cameras, health products and learning toys; and home security products.

However around 1995 the company apparently began to feel that the original DSE store concept had probably been pushed about as far as it would go, and that in order to achieve further growth they'd probably need to move in a different direction — one more in tune with the present and future needs of a wider section of Australian consumers.

Noting the growth of electronic 'super-

The first of DSE's very successful PowerHouse stores, opened in Bankstown in August 1996.

Taken inside the Carnegie store, this overview shot gives some idea of the breadth and scope of the Dick Smith Electronics PowerHouse concept.



stores' like the Fry's Electronics chain in California, and also some of the 'computer warehouse' stores that had begun to appear here, they decided that this general approach had merit, but needed to be adapted and developed further. For a start, any truly 'new concept' electronics store would need to take account of the way computers, communications and entertainment electronics are all rapidly converging, as part of the digital revolution...

In any case they didn't want to produce just a bigger version of their existing stores, or some vast electronics retailing barn with acres of products on racks, almost no staff to be found and a "you find it and lug it back to the checkouts, we'll take your money" approach. There had to be a way to expand the whole concept, so that consumers would not only find the new stores their 'one-stop-shop' for virtually any new electronics-based product, but also be able to try them out and get real help in evaluating the product's suitability for their particular need.

Well, to cut the story short, the concept they came up with is seen in the PowerHouse stores. And yes, they are quite a lot bigger than the typical Dick Smith Electronics store that we're all familiar with: about six times larger, at about 2000 square metres total.

Dick Smith Electronics PowerHouse store locations

Bankstown

Christie's Homemaker Centre,
173 Canterbury Road, Bankstown.

Penrith

Cnr Batt Street & Mulgoa Road, Penrith.

Carnegie

1054 Dandenong Road, Carnegie.

Moore Park

Homemaker Supa Centa,
South Dowling Street, Moore Park.
(between Dacey & Todman Avenues)

And they do carry many more stock lines — over 20,000, in fact.

There is a row of supermarket-style check-outs where your purchase is finally processed, too. But the PowerHouses are a lot more than just a traditional DSE outlet on steroids.

For a start, there's certainly no shortage of sales staff; if anything the staffing has been increased by an even larger factor than the store size. And unlike many of the sales people you'll find in traditional electronics 'browngoods' retail/discount outlets, these people do indeed know their products. DSE has put a lot of effort into both selecting knowledgeable sales people for these stores, and giving them the necessary training.

Quite apart from this, though, the emphasis of the PowerHouse stores seems to be in a direction quite different from the 'discount warehouse' approach. Instead of expecting you to have worked out exactly which product you want, in advance, and simply drop into the store for an arm-wrestle over the price, DSE has put a great deal of effort into actually helping you make an informed buying decision. They've done this by providing not only well-trained sales staff, but also the facilities for customers to try out many of the products 'live', for themselves.

As DSE managing director Jeff Grover says, "The PowerHouse concept focuses on the convergence of consumer technology in the Australian community. Everything at a Dick Smith Electronics PowerHouse is plugged in, powered up and fully tuned for our customers to try out. The aim is to bring all kinds of electronic, communications and computer-based technology to Australians in a fun, informative and non-threatening environment."

While this concept may not be new, it definitely has advantages for customers like you and me, especially when we're contemplating the purchase of today's increasingly high-tech items. Unfortunately it's also a concept that many retailers have long since scrapped in their efforts to survive in a highly aggressive marketplace. All credit to Dick Smith Electronics for bringing it back to life — and it's clearly making the PowerHouse stores very successful.

Here's some examples of what I mean. In the Communications department, you can try out virtually every model of fax machine on offer — sending a fax back to your office, if you wish, and even getting your office to send back a test page to a machine so you can check its receive quality. The same applies to cordless phones, answering machines and so on.

Similarly in the Computers department,

DSE PowerHouses

In the communications department of each PowerHouse there's a wide range of phones, faxes and answering machines, many of them connected to lines for customer testing.

you're welcome to test any of the desktops, laptops, printers, scanners, modems and other peripherals. You can also sit down at a PC, with or without a sales consultant, and design a DSX-brand PC to your own specification, configuring it in the way that will best meet your needs. You can see exactly what the computer will cost, as you proceed, and when you're happy the sale can be processed. Your order and specification are then transmitted directly to the factory, where the computer is built and delivered to your door within eight working days.

In the VCR and camcorders area, you're also able to try out the demo models and



Packard, IBM, Compaq and Toshiba.

In the same area the range of software is also much larger, and covers everything from operating systems and utilities right through to business software and games. In

Here again, though, the PowerHouses are not just clones of department stores or record outlets...

even play one of your own tapes, if you wish. You can also try out one of the latest digital still cameras.

Big name brands

Traditional Dick Smith stores tended to stock mainly house and discount brands, which allowed them to offer better value for money. However the new PowerHouse stores offer a much wider range of big-name brands and models, to give customers a much wider range of choices in terms of features and pricing. For example in the Computers section you'll find major brands like Hewlett-

fact it's larger than in many dedicated computer stores, and really quite staggering.

To help people pondering whether they should buy a computer capable of 'surfing the Net', or what they'd use it for, each PowerHouse has an 'Internet Bar' near the Computers area, where you can sit down and quietly 'explore cyberspace' for yourself.

For those who want to add multimedia facilities to their home or office computer, there's also an area where you can compare the performance of different multimedia speaker systems. A similar area not far away allows you to compare the sound from vari-

ous car sound systems and speakers...

Of course one of the big differences between the PowerHouse and ordinary Dick Smith stores is its much wider overall product range. As well as all the traditional products, there's a wide range of TV sets, VCRs, camcorders, hifi systems and amplifiers — plus a big range of pre-recorded videotapes (2000 titles), DVDs and audio CDs (10,000 titles). In fact this part of each PowerHouse is very reminiscent of the consumer electronics department of a high-end department store, or a dedicated record/video store. Like many of the better record stores there are listening stations in the audio CD department too, so you can listen to discs before you buy.

Here again, though, the PowerHouses are not just clones of department stores or record outlets; there are some subtle but important differences. For a start, there isn't the usual bewildering array of umpteen different hardware brands and models, distinguished mainly by price; instead DSE's buyers make a careful selection, and present a reasonable range of quality brands and models with features that are often complementary. In TV



Each PowerHouse stocks a wide range of TV and audio-visual products, and includes a home theatre sound room.

FEEL THE POWER

\$199



YAMAHA Speakers and subwoofer

This totally integrated system features 25 watts RMS per channel speakers with increased bass, dual stereo signal inputs and headphone jack.

XH4671

\$499



17" DSX monitor

Large screen monitor features low radiation, digital controls with on-screen display and a 70KHz refresh rate. Non-interlaced with up to 1280 x 1024 resolution.

XC8513

\$649



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CD Writer Plus 7200i

Quality CD burner from HP. Will read (6x), write (2x) and re-write (2x) CDs. Is easy to use, you can drag and drop files or save directly to CD from an application.

XH4045

\$1197



Pioneer

Multi-zone DVD player

Play the latest Hollywood blockbusters in style on this dual system (NTSC/PAL) with twin-laser pick-up & Virtual Dolby surround sound.

G 0559 DV515S

\$379



SONY 5 disc CD player

Features variable output, custom edit, shuffle, program, edit & repeat and remote control with volume. A 0546

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\$1999



Pioneer

AC3/DPL receiver

Features Dolby Digital and THX 5.1 surround sound. With on-screen graphic interface, sound field control and a front AV input. 100W x 5, 5 video inputs, preamp output for all five channels and subwoofer. A 0988



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All savings shown are off our regular prices. If a currently advertised product is sold out or unavailable due to circumstances beyond our control, we will issue a raincheck for later purchase of the item or an equivalent at the advertised price if a suitable product is available. Products advertised as limited, discontinued or clearance are available only while stocks last and rainchecks do not apply. We reserve the right to limit the quantity per customer to normal retail quantities.

MOORE PARK – Moore Park Sup a Centa, Cnr South Dowling St & Todman Ave. Tel: 9697 0244

BANKSTOWN – The Christie Centre, Cnr Chapel & Canterbury Rds. Tel: 9793 9677

PENRITH – Corner of Mulgoa Road and Batt Street. Tel: (02) 4721 1544

CARNEGIE (VIC) – 1048-1054 Dandenong Road. Tel: 9569 2644

**DICK SMITH
ELECTRONICS**
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HOUSE**

DSE PowerHouses

receivers, for example, there are about four choices of small-screen 'personal' set, four medium-sized sets, four large-screen stereo models and a couple of widescreen models. And you can see how each one performs, either off-air or playing a videotape, laserdisc or DVD movie.

That brings me to the demonstration rooms. These are two of the most impressive features of the PowerHouses, with one dedicated to hi-fi amplifiers, receivers and speaker systems, and the other to 'home theatre' and surround sound systems. Both have systems to allow fast and convenient switching between a variety of signal sources, amplifiers and speaker systems, for easy 'A-B' comparisons. The home theatre demo room also has a large-screen TV, the ability to try a variety of rear-channel speakers and subwoofer systems quite separately from the main speakers, and of course the ability to play material from DVDs and laserdisks as well as videotape. Very impressive!

Another new feature is a fully functioning digital editing suite, where you can try your hand at using a computer to produce much more professional home videos.

Technical section

At this stage, if you haven't actually visited a PowerHouse store as yet, you may be wondering if all this expansion and enhancement of what we might call the 'consumer electronics' section of the PowerHouses has been at the expense of the traditional DSE emphasis on components, kits and equipment for the technician, hobbyist and amateur radio enthusiast. Not at all, as it happens. In fact the 'technical' part of each PowerHouse is also very impressive, and probably by itself larger than the majority of DSE's traditional stores.

This area isn't just larger, either; it's been enhanced as well. There's a larger range of test instruments, for example, and a very impressive area with built-up and working demonstrations of many of the more popular electronics kits — including DSE's own



There's also a wide range of music CDs and video titles (above), with convenient listening posts. But technicians and enthusiasts are not forgotten either; they actually have a wider range to choose from, as seen below.



of antennas on the roof, to ensure that everything works properly.

Another nice feature in the technical section is a quite respectable reference data section, stocked with a range of data books from many semiconductor makers and other component manufacturers. There's even a photocopier, so you can make copies of the data you need and take it home. Why didn't somebody think of this before?

The PowerHouses also feature a small Upgrade Centre on site, with technicians who are able to make minor repairs and also perform various on-the-spot upgrades to comput-

Successful formula

Hopefully, this article has given you more of an idea of the differences between DSE's new PowerHouse stores and traditional retail electronics outlets. Mind you, the full impact of what DSE has achieved with these new concept stores probably won't hit you unless you spend an hour or two walking around one yourself.

Spend a couple of hours walking around an electronics store, I hear you ask? Yes, if you haven't been inside one it might sound strange — but remember, they're no ordinary electronics store. To me, the PowerHouses are a very interesting and welcome development in electronics retailing, and it's been good to see that customers have responded to them so warmly.

Dick Smith Electronics is to be congratulated on their initiative in developing the PowerHouse concept, and for continuing to build on its success by opening more of the stores. I understand that the new Moore Park PowerHouse is not likely to be the last, either, as further stores are already being planned.

Don't take my word for what these new stores are like, though. Why not pay your nearest PowerHouse a visit and check it out for yourself? You'll find their address details in the panel. ♦

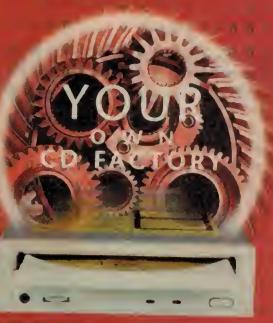
In fact the 'technical' section of each PowerHouse is probably larger than most of DSE's traditional stores...

Funway and Discovery kits, of course. On weekends there are often live demonstrations of kit building, to show kids and their parents how easy and rewarding it can be.

There's also a 'Ham Radio Shack', where radio amateurs and would-be amateurs can try out equipment for themselves on air. Each PowerHouse has an impressive array

of antennas on the roof, to ensure that everything works properly.

By the way, the stores also include a Telstra kiosk, where customers can try out and buy a range of cellular and traditional phones, and also see what's available on Foxtel pay-TV.



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Sony's VPL-SC50M Video Projector

Capable of projecting SVGA resolution (800 x 600) computer graphics as well as 600-line resolution multistandard video, this new Sony triple-LCD projector also establishes new benchmarks in terms of compactness, portability and ease of setup.

Here's a hands-on report.

by Jim Rowe

BACK IN OUR February issue, Louis Challis looked at the new Sony VPL-S600M Data & Video Projector and was most impressed. Although still fairly expensive at around \$8200 plus sales tax, it offered excellent image quality combined with a wealth of features including high light output (600 ANSI lumens), a motorised zoom lens with full remote control of zooming and focusing, automatic signal recognition and a built-in test pattern for setup adjustment.

Quite apart from its intended use as a tool for business presentations, Louis found the VPL-S600M almost perfect for another obvious application: large screen display of movies from DVD players, laserdisc players and video recorders. In fact he decided that assuming one could justify the price, it would be almost ideally suited for use in a home theatre. His only real criticism was that acoustic noise generated by the cooling fan tended to become intrusive for quiet viewing.

Bearing these comments and reactions in mind, I was most interested in accepting Sony's invitation to try out another of their new video/data projectors, the VPL-SC50M. This is considerably more compact than the S600M, with a slim 'portrait' format rather than the more usual 'landscape' shape and measuring only 107 x 218 x 314mm (W x H x D), with a weight of only 3.7kg. It's also significantly lower in price, at \$8418 including tax.

Despite the smaller size and lower price, the rated performance specs of the VPL-SC50M are still very impressive. It's again capable of full SVGA (800 x 600 pixel) graphics resolution, with a horizontal resolution of 600 lines for video — quite sufficient to achieve the potential of DVDs, especially

when the S-Video input is used. The image brightness is also 500 ANSI lumens, not far behind that of its bigger brother. And as before, it's able to automatically recognise a wide range of video and graphics formats, and lock to them reliably.

But what *don't* you get, bearing in mind the SPL-SC50M's smaller package and lower price? Well, for a start, the three LCD panels are a little smaller, with active areas 23mm (0.9") square rather than the 33mm (1.3") panels used in the S600M. Although the smaller panels provide the same resolution (3 x 480,000 pixels), the smaller size is probably the main factor behind the projector's lower light output, from nominally the same 120W UHP lamp.

has an inbuilt feature which actually makes setup simpler than a traditional projector — especially in typical boardroom or sales presentation situations. This is an optical axis which is deliberately offset upward in the vertical direction, and pre-compensated to avoid trapezoidal distortion when the projector is placed on a horizontal surface.

So as with the S600M, you can achieve a rectangular and undistorted picture on a vertical screen simply by placing the SC50M on a boardroom table — or even a coffee table, since the upwardly tilted projection axis automatically moves the picture up to a practical height. You only get distortion if you try moving the picture higher again, by tilting the projector up from the horizontal.

By the way, despite its slim 'vertical' format the SC50M is relatively stable, partly because of its compact construction (with a relatively low centre of gravity) and partly because the designers have made the front feet extendable, to provide a wider footprint. They only extend by another 20mm or so, but it's enough...

As with its bigger brother, the SC50M again comes with a pair of inbuilt audio amps and speakers, although in this case they're even smaller than those in the S600M (36mm) — and really only suitable for things like sales presentations.

There's also a multifunction IR remote control, which allows you to change many of the projector's settings via the on-screen menu system. You can also adjust the volume from the internal speakers, as well.

Oh — I almost forgot, the remote control again has an inbuilt laser pointer, and can be used as a mouse when you're using the projector with a computer.

The SC50M is again also fully multi-standard when it comes to both computer graphics



For video there's an S-Video input as well as composite video and stereo audio inputs. For computer use it accepts up to XGA video (shown compressed), and delivers a mouse output.

Next, the SC50M provides only a manual zoom lens, with a modest zoom ratio of only 1.2:1 and manual focussing. This isn't likely to be much of a limitation in many applications, of course; setting up this kind of single-lens/locked convergence projector is essentially a simple operation, with no more hassle than setting up a traditional slide or movie projector.

In fact like its larger brother, the SC50M



and video. For computer graphics it can cope with any horizontal scan rate from 24kHz to 57kHz, and with any vertical rate from 43Hz to 85Hz; i.e., VGA, SVGA and even XGA in an automatically compressed form. Even Macintosh signals can be displayed, using a small signal adapter (supplied).

On the video side it accepts both composite and S-Video formats, and can accept NTSC, PAL, SECAM, NTSC 4.43 or PAL-M signals. In short, pretty well all of the signals most people are going to want to display.

Trying it out

I was able to try out a review sample of the VPL-SC50M with both a PC and a number of video sources, including a DVD player with S-Video output and a laserdisc player with composite video output. In each case I used it in conjunction with a matt white screen measuring about 1.5m diagonally, and with a throw (projection distance) of about 2.5m.

It turned out to be very easy to set up and adjust for optimum image quality, thanks to the inbuilt test signal and on-screen setup menus. The only real penalty for the manual focusing and limited zoom range are that it can take a little while longer to find the correct location for the projector, to achieve a picture which just fills the screen without overflow.

Once set up, the VPL-SC50 gave a very

good account of itself. The picture is bright and sharp over the full area, with no discernable distortion providing you have the projector on a truly horizontal surface (i.e., no raking). Checks with both the computer graphics output and the video signals also showed that its resolution is quite sufficient for high quality presentations, with video performance from a DVD using the S-Video input being most impressive.

As with the projector's big brother, the acoustic noise from the cooling fan is again noticeable, and could conceivably be a problem with low-level audio delivered via the internal speakers. But it's not likely to be a serious problem in home theatre applications, where a separate sound system will tend to be used.

My overall impression is that this projector would make an excellent tool for sales and other business presentations, and would also be very suitable for home theatre use — for those who can afford it.

There's no arguing that this type of projector does provide a very effective way of achieving a visual impact approaching that of a cinema. This new model from Sony also achieves new benchmarks in terms of compactness, image quality, ease of use and price — although there's still some way to go in terms of reducing the last parameter, before most of us are going to be able to afford one.

We can always dream, though, can't we?

By the way Sony also has an XGA (1024 x 768 pixel) resolution version of this projector, for those who simply must have the higher resolution for high-res computer graphics. This model is also reputed to have lower fan noise, too. But be warned: it's also about \$5000 more expensive. ♦

Sony VPL-SC50M Data & Video Projector

A very compact three-LCD video projector with a light output of 500 ANSI lumens, delivering 800 x 600 pixel resolution for computer graphics and 600 lines for video.

Good points: Compact and light weight, good light output, excellent resolution; able to display full DVD quality, especially using S-Video input. Multi-standard (NTSC/PAL/Secam).

Bad points: Acoustic noise from cooling fan tends to intrude; otherwise very little to complain about.

RRP: \$8418 including tax.

Available: Sony Broadcast & Professional Systems Division, with offices in each capital city. For more information call 1800 017 669.

Forum

Conducted by Jim Rowe



Holding our breath on high speed comms, and a newcomer's plea for help...

Can you expect to be surfing the internet soon at megabit speeds, or was I pretty right with my leader last October, about most of us having to persevere with relatively low speed modems for quite a while yet? That's the topic addressed by one of this month's letters. But first we have a plea for help, from a newcomer trying to break into electronics servicing — and caught in a vicious circle.

FROM TIME TO TIME, here in Forum, we've looked at some of the serious problems facing Australia's servicing industry. Like the way so much modern consumer electronics gear is designed and built purely to minimise manufacturing costs, with little thought for efficient servicing later; the way so much of the sales side of the business has adopted the 'throw it away and buy a new one' strategy, discounting the value of servicing; and the way many of the larger firms have closed down their in-house service divisions and contracted the work out, to smaller firms who frequently can't afford to pay the wages that skilled service technicians are really worth, let alone train new people.

That side of the story is fairly familiar, albeit very sobering. But while we've had some heartrending letters from experienced technicians who've seen their careers disintegrate, we haven't heard much from another group of people: young people who like the challenges and satisfactions of tracking down and rectifying faults in electronic gear, and would like to make it their career — only to find themselves facing almost insuperable hurdles.

For a start, there's often the old vicious circle of needing experience before firms are willing to employ you, but finding that there's no way to support yourself while you're getting that experience...

All of which is by way of preamble to our first letter this month, which comes from reader R. Fox of Narre Warren in Victoria. Describing himself (I'm guessing it's a young male) as a 'newcomer whose hopes of a rewarding career in the TV servicing industry are slowly fading away', he sent the following letter in the hope that I might be able to publish it for your consideration:

Help! I am a relative newcomer to the wonderful world of electronics servicing, having completed my Basic Certificate in Electronics and my Advanced Certificate in Electronics (TV and Audio stream) at TAFE. I am now trying to find employment in the TV

servicing industry, but this is proving to be extremely difficult — mainly due to my lack of actual hands-on experience.

Whilst many employers have been impressed with my certificate results, they have expressed their desire to employ a person who already has considerable experience. Unfortunately I have as yet to find an employer willing to offer me the opportunity to acquire this experience. Therefore I am attempting to complete as many repairs as possible from my home, with the belief that with each repair, I am adding to my possibilities of finding full-time employment. As I am quickly discovering, however, repairing equipment from home can at times prove to be very difficult and time consuming.

Frustrating, disheartening

Now I must admit that I never for one minute expected it would be easy. I knew I would have to allow the time to locate, order and then receive various circuit diagrams and replacement components, etc. What is becoming more and more frustrating, and disheartening, is not having the appropriate test equipment, to carry out my servicing in a competent, orderly and time efficient manner.

I do have the very basic equipment such as a digital and an analog multimeter, a pattern generator (made at TAFE), a soldering iron and other hand tools. But due to my extreme lack of finances, things such as a signal generator, alignment tools and tapes, a degaussing wand — and more important and needed than anything else, an oscilloscope — seem to be nothing more than wishful thinking.

This now brings me to the main point of this letter. I am asking if there may be a sympathetic reader out there, who for whatever reason may have some items of test equipment which they no longer need or want, and are willing to pass it on to a struggling and desperate newcomer. More, than anything, a CRO would be invaluable.

I realise that this type of equipment is quite costly, but basically I feel this is my

only real hope of developing my career. I may be able to pay for some items if they are extremely well priced, but ideally I am hoping there is someone out there who wishes for nothing more than my heartfelt gratitude. Perhaps someone may have some equipment which requires some minor repairs, which I could complete, thereby also adding to my experience.

If there is a reader who feels they may be able to help, please don't hesitate to contact me on (03) 9704 7464.

Hmmm — there you are. It's a sad reflection on the parlous state of our servicing industry, isn't it? I don't know about you, but I do feel for people like R. Fox, who seems to be really keen to pursue a career in servicing but is gradually losing hope of this ever being achievable.

It's sad that this is happening, because servicing can be a very stimulating and worthwhile occupation — and also one that surely performs an important role in our modern technological society. Do we really want to become a wasteful 'throw it away, don't bother to fix it' society?

Whether you agree with me or not, if you happen to have some old and unwanted items of test equipment that you think R. Fox could use, perhaps you'd like to give him a call. Either that, or you can write or email me and I'll pass on the good news to him.

Wideband data comms

Changing the subject, you may recall that in my October 1998 leader I wrote about the delays in bringing so many of the much-touted new wideband data communications technologies to market. I suggested that as a result many of us were likely to be still using our trusty 33.6kb/s or at best 56kb/s modems for quite a while yet, despite all the hype.

Perhaps surprisingly, I haven't had much response to this. There was one letter from an engineer at HP, defending Telstra's Big Pond cable service from what he read as unfair criticism, but apart from that my only other bite came from our old friend and con-



tributor Alan Fowler, recently retired after a long and illustrious career in the engineering side of Telstra.

Alan is a very experienced telecommunications engineer, so I feel sure you'll find his comments of interest. I've actually had the letter a few months (sorry, Alan), but haven't had the opportunity to use it until now. Here it is, though, at last:

I have been going to write to you for a couple of weeks, and the October Editorial on wideband data communications has got me moving at last. Frankly, I wouldn't hold your breath waiting for general availability of high speed data to and from home. Once Telstra is fully privatised, it's going to be a case of 'Profits Before People' and I cannot see any private company providing high capacity digital service at price that will be affordable for home/SOHO users.

I have enclosed two articles. The first is 'The Telecommunication Riot Act of 1998' from <http://www.suethebells.com>; while the second is an updated version of my article 'Why Don't High Speed Modems Work At Their "Rated" Speed?', published in the September 1998 issue of PC Update, the magazine of the Melbourne PC User Group.

If the 'Riot Act' is correct, American telephone users are worse off than we are. The telephone companies have been promising all sorts of high speed data transmission for many years, but not delivering. It also seems

that competition is forcing up prices, rather than reducing them. As I read the article you can substitute Australian telcos for American telcos to see what is going to happen here. The only real difference is that we have a single Federal Regulator while America has a separate Regulator for each state, to add to the confusion.

The second article is a general description of 56k modems and the problems that stop them operating at the maximum speed of 56,000 bit/s (Note: Not 57.6 kbit/s as mentioned in the October Editorial). 56k (note lower case k) is the generic name for the three current standards, K56flex, x2 and V.90.

V.90 was finally confirmed by the ITU this month (September 1998) and is supposed to allow any V.90 modem to operate with the V.90 modems used by any ISP. Unfortunately, it appears that a number of key items in V.90 have not been specified in detail, and the actual implementation has been left to each manufacturer. It looks as though we are going to see the electronic equivalent of metric bolts fitted with Whitworth nuts — a poor fit. It could be a year or more before commonsense prevails and all V.90 modems will be compatible.

As you read my paper you will see why V.90 is not going to give the promised doubling of speed over a 28,800 bit/s modem. It's more likely to be a more modest 45% to

80% (42,000 to 52,000 bit/s) in practice. For perhaps 10% to 20% of users, the telephone network will limit the speed of 56k modems to 33,600 bit/s or less. In effect the purchaser will have bought an expensive 33,600 bit/s modem.

A question of ethics

The information on some modem boxes offers speeds up to 56,000 bit/s, others simply say the modem will operate at 56,000 bit/s. This leads to a question of ethics. Should the manufacturers, distributors and retailers be required to tell the customer that the modem may not operate at the full advertised speed? Should they be required to offer a full refund of the price paid if the modem is not able to run at high speed due to the line conditions?

Different makes or models of modems may be able to compensate for particular line problems. Should the manufacturers be required to let the customer try several different modems in an attempt to find a 'best fit'? What do you, and possibly your readers, think?

It's not just 56k modems that are affected. I use a 33,600 bit/s modem and connect to the 33,600 bit/s lines of an ISP about twice a day on average. Both ends of the connection are copper pairs from the exchange, with a digital connection between exchanges. The initial carrier speed is usually 31,200 bit/s

and occasionally 28,800 bit/s. During a session the carrier speed varies up and down over a range of values as the modem adjusts to the line conditions. Mine varies up to a maximum of 33,600 bit/s and the lowest recorded to date is 12,000 bit/s.

My modem uses a Rockwell chipset, and the speed and other information was obtained using the AT&V1 command at the end of a session. I use Trumpet Winsock, which has script files for LOGIN and BYE. I simply added the AT&V1 command to the BYE.CMD script file. The command can also be issued from any terminal program after signing off, provided that the modem has not been reset, destroying the stored data. USRobotics-3Com modems can be interrogated to produce similar data, using different AT commands.

Have a look at the spreadsheet at the back of the report to get a feel for the changes that take place. The 'Line Quality' reported is a misnomer. The best line has a quality of zero, and the higher the number the worse the quality. Different manufacturers appear to calculate this figure in different ways, so results from different modems cannot be compared easily.

Very few users are aware that the modem may change speed as much as this, or that

this affects the throughput. I certainly wasn't until I started measuring the speeds, and I have been using modems since I bought a 300 bit/s modem many years ago.

Also, have a look at the comp.dcom.modems newsgroup, for the problems that users are having with all sorts of modems.

On a different matter, I had a ring from Telstra Sales about a month ago saying that 10 Mbit/s cable access (upgradable to 30 Mbit/s) was now available to homes in our area and would I be interested. We signed up with Foxtel some time ago with the intention of perhaps getting cable internet in due course, so a demonstration was organised for the following weekend. They never showed up. No message, no apology. I've looked up the prices on Telstra's Web site since then, and they are not cost effective for the couple of hours a day I use.

Interesting comparison

I also looked at a comparison at a trade show earlier this year. From memory there was a 33,600 bit/s feed, an ISDN feed and a 10 Mbit/s feed on three separate screens. The 10 Mbit/s was certainly impressive for material coming off a local server, with web pages flashing up as I clicked on links. However, when I called up an American site that I know is often overloaded and which often drops down to six or eight bytes per second, it was still 6-8 bytes per second on the 10 Mbit/s feed!

After collecting information about high speed modems and the problems of using them for a month or two, I was in hospital for three days having a heart pacemaker fitted (another story altogether). To pass the time, I started roughing out an article covering the way the modems worked and why they so often operated at lower than maximum speed. Four months of further study and collecting information, mostly from newsgroups and discussions with a number of experts, 4414 minutes sitting in front of the computer spread over 241 sessions typing, revising and thinking, and 10,039 words later (according to the statistics from MS Word 2 for Windows) and you have the attached report.

Just because the report is big doesn't mean it is accurate. However, I've spent a lot of time checking and cross checking the information I have gathered and I believe the report sets out a fair picture.

The biggest task has been in separating out the gems of truth from a mountain of material that ranges from 'old wives' tales' through half-truths to items that are completely wrong.

Many people write about 'bandwidth' of a digital link in Mb/s. Instead, they should be writing about the 'capacity' of a digital link.

Bandwidth is an analog term, and continually misusing it just increases the confusion. It's also largely irrelevant for digital transmission. Just as soon as we are sure we have reached the limit and that it's impossible to get even a tiny bit extra capacity, somebody comes along with a new technique and the sky's the limit again.

Others use BPS or bps to mean both bits per second and bytes per second. That has caused a lot of arguments about the speed of data transmission. Personally I prefer the ITU 'bit/s' to avoid confusion. Very many use 'K' instead of 'k' as the abbreviation for the metric kilo.

I saw one article recently which defined kbit/s as 1024 bit/s, and a Mbit/s as 1024 x 1024 bit/s. It's over 30 years since we changed to the metric system. What's wrong with our education system that we cannot even use the metric multipliers correctly?

Many confuse the CONNECT speed reported by a modem with the CARRIER speed. CONNECT is the speed of the digital link between the computer and the modem — i.e., the port speed. CARRIER is the transmission speed on the telephone line.

There was a prime example recently in a newsgroup debate on the pros and cons of American built modems and Australian modems designed for the Australian telephone network. One contributor claimed it was all marketing hype. He had bought an American modem because it had consistently rated highest in throughput in magazine tests, and it was running consistently at 57,600 bit/s when connected to his ISP. Unfortunately he had bought a 3Com-USRobotics modem which uses the x2 design, and was connected to an ISP which used K56flex modems (Rockwell-Lucent design). The two are completely incompatible, and the maximum carrier speed would have been 33,600 bit/s, and probably less in practice.

Others are convinced that their modems are running at 115,200 bit/s, which is again the port speed, not the line speed.

Thanks for those comments, Alan. You seem to have basically supported what I said in the leader, as well as providing a lot of further clarification regarding just what kind of performance we can all expect from the latest breed of modems, in practice. I certainly found that interesting.

Thanks too for correcting me on the error I made in the leader, describing the new 56k modems as having a maximum speed of 57.6kb/s. I'm sure I've seen that figure bandied around, but presumably by others making the same error.

I'm sure many of our long-time readers will also join me in wishing you all the best with your new heart pacemaker, too. I hope it serves you well for many years to come.

That's all we have room for this month, though. See you here at the Forum next time, I hope. If you'd like us to discuss a topic you think we've missed, let me know. ♦

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Serviceman

Animal crackers and other alarming tales



As you'll see, animals of one kind or another play a large part in several of this month's stories. Quite a few also concern interesting 'learning adventures' with PIR detectors and security alarms...

OUR FIRST STORY comes from John Bell, of Craigmore in South Australia. Actually, John's story goes back quite a few years and it is unlikely that the relevant equipment is still in service. But the nature of the fault still has a salutary warning for anyone working with mains powered appliances.

Here's what John has to say...

Let me tell you an animal story which, although humorous, could have had fatal consequences. Early in my electronics career I was asked by our local MP to repair a simple five-valve radio receiver, being informed that set was quite 'dead'. On inspection, I immediately saw that none of the valve heaters were glowing.

This type of set was designed for 115V mains operation, with the heaters all wired in series. To allow operation within a 230/240V system the mains cord was a resistive type, the so-called line cord, which dropped 115V and so allowed the set to 'see' only 115V.

The fault was trivial in that as one valve heater was open-circuit, no current could pass. However, upon checking the operation of the line cord I found that it had been cut short and was not dropping the required voltage.

I fitted a new cord, replaced the faulty valve and handed the set back to its owner.

Like most people the owner usually left the set plugged in and switched on, using the on/off switch on the receiver to activate the set.

Some weeks later he told me that whilst he was out of the house the kitchen had caught fire and the Fire Brigade had been called. The cause of the fire was laid squarely upon my newly installed line cord, which had overheated and started the fire.

An investigative unit was then called in to check what had happened. The officer con-

cerned felt the remains of the cord and found part of it damp; he asked my friend whether he had spilt anything on it, suggesting an upturned vase of flowers or the like. The answer was "No".

The officer then smelt my new line cord and immediately asked "Where's your cat?"

What had happened was that the cat had been left in for a long period and had decided to relieve itself on the kitchen dresser, its urine soaking the power cord—so destroying some of the insulation. Enough heat was then generated by the partial short to cause ignition.

As far as I know this type of imported transformerless receiver, designed for 115V mains

something from the story, too!

Over the years we've had many cat stories, most of which dealt with the corrosive properties of cat 'secretions'. When you see what the liquid can do to electronics, you wonder about the anti-corrosive properties of the cat's interior.

Unfortunately, John, the resistive power cord has not entirely disappeared. It still reappears occasionally in 'travel' products. Many of them are convenience items bought by travellers overseas where safety rules are far less stringent.

I have seen mini-TVs, portable irons, electric razors and combination clock-radios, all designed for 110V operation and supplied with a resistive power cord to allow use on 230/240V mains.

The problem is, of course, that the cord only drops the correct voltage when used with the appropriate appliance. Use a TV cord with an electric razor and you are likely to find yourself holding a handful of hot charcoal! (Though that would be very effective in removing your beard!)

And of course, this kind of cord must always remain at its full length. Any damage to the plug or socket requires the replacement of the whole cord. Just replacing the damage requires shortening the cord, which is a serious NO-NO.

Thanks for that story, John. It has several lessons, for all concerned.

No false alarms!

Still in keeping with our animal theme, here are two short items from Robert Hitchin of Burpengary, in Queensland. (Don't you just LOVE Australian place names?)

As you'll see, neither of Robert's stories required the use of soldering iron or screwdriv-



and with series connected valve heaters soon disappeared from the market—and a good job too.

I hope the incident taught that cat a lesson. And I have no doubt that John learned

Serviceman

has not entirely disappeared. It still reappears occasionally in 'travel' products. Many of them are convenience items bought by travellers overseas where safety rules are far less stringent.

I have seen mini-TVs, portable irons, electric razors and combination clock-radios, all designed for 110V operation and supplied with a resistive power cord to allow use on 230/240V mains.

The problem is, of course, that the cord only drops the correct voltage when used with the appropriate appliance. Use a TV cord with an electric razor and you are likely to find yourself holding a handful of hot charcoal! (Though that would be very effective in removing your beard!)

And of course, this kind of cord must always remain at its full length. Any damage to the plug or socket requires the replacement of the whole cord. Just replacing the damage requires shortening the cord, which is a serious NO-NO.

Thanks for that story, John. It has several lessons, for all concerned.

No false alarms!

Still in keeping with our animal theme, here are two short items from Robert Hitchin of Burpengarry, in Queensland. (Don't you just LOVE Australian place names?)

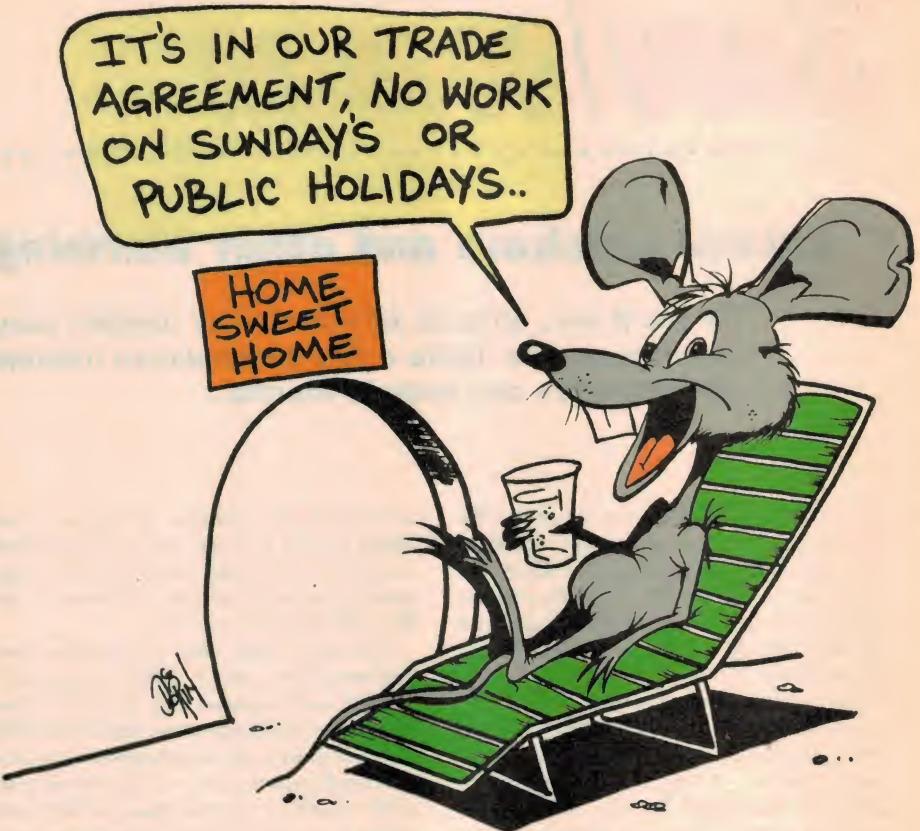
As you'll see, neither of Robert's stories required the use of soldering iron or screwdriver. Where animals are concerned, many repair jobs call for very non-technical spare parts. See what you think of Robert's recollections:

As a reader of your magazine from as far back as the Radio and Hobbies days, I am living proof that you must be doing something right. Particularly the Serviceman section, as this not only provides an answer to the problem but usually also the reasoning behind it. It is hard to tell which is the most important. (Thanks for the kind words, Robert. We try to please! Ed.)

Having spent a very large portion of my working life in the security industry, my experience has more to do with alarms than consumer goods; but the two are still related. In the October issue you were discussing the ins and outs of ants in electronic items, and this reminded me of two cases of driveway alarms that had similar problems.

Both systems were similar in that they consisted of an infra-red photoelectric beam across the driveway providing visitor warning to the house. Not a big thing in the city, but a definite help in the country where sheds and equipment are seldom properly secured.

Both of these units were sealed against the elements and worked well for some months — after which they began going off at random. In this situation you always get the odd wildlife or even a stray leaf that will set the alarm off, but these are not too frequent.



At this point I should explain that there is no such thing as a false alarm. You always detect something. It may not be what you want, but it is still a valid detection.

In both of these cases they were detecting an invasion of tiny brown ants, that had decided to build their nest inside the nice dry space we had provided. After that we had the client keep an eye on ant activity in the area, and never had the problem again.

Vermin of a larger type can also be a problem, as we found out after fitting an alarm to a new house that was being used as an office on a large rural property.

The system was very well behaved when first commissioned, but a few months down the track it began going off at random times without apparent reason. The alarm was checked and we even went to the extent of changing the passive infra-red detector on the sector concerned, but to no avail.

It was interesting that it never triggered on a Sunday, or on public holidays during daylight hours!

In the end we obtained keys from the client and as soon as the triggering started we entered the house — but could see nothing. We spent about 20 minutes inside, then secured the premises and reset the alarm.

As we got into the car the alarm triggered again. Frustration had set in by this time, so we entered the house, settled down within sight of the suspect detector and waited.

This detector was an average sized unit, seven centimetres high by five centimetres wide, fitted in the corner of two adjoining gyproc walls. The cable came out of the unit and disappeared through a neat hole drilled just below the detector.

After a couple of minutes waiting, a small movement was seen just above the cable. A very small mouse appeared, climbed paw over paw to the top of the detector and then leapt from there to a nearby shelf.

Needless to say the alarm went off immediately, as the detector would have registered our mouse at that distance about the same as it would have seen a football team at the end of the hallway.

A piece of clear sticky tape sealed the wall to the cable. The client was advised and the problem stopped. I have often wondered if alarm installers should also run a pest control business on the side.

Robert, I have often made that comment myself, after one or another of our animal stories. Either that, or we should come to an arrangement with some professional pest controllers. The commission on referrals might compensate for some of the lost time waiting for the pests to show up!

Thanks for those stories, Robert, but you have left one question unanswered — why did the mouse not appear on Sundays or public holidays? Logic would suggest that those would be the most likely times...

switches will be out of PIR range.

Having built the first timing circuit on a small multi-purpose PCB from Jaycar, I dug out the PIR to check that all was OK at this stage. An LED and dropping resistor were attached to the siren output from the relay for initial testing.

The PIR was in a sad state — it was covered in soot from being stored too close to where I start up my motorcycle each morning. (It had last seen service several years ago as a 'granny detector' for a friend whose elderly, forgetful grandmother used to wander outside without telling anyone.) I cleaned up the detector, then wired up the timer circuit and PIR and applied power.

Unfortunately the PIR's test LED lit up and would not go out. I removed the PCB from the PIR case and inspected it, then applied power again. Now nothing! It took a couple of minutes of playing around to accept the fact that this PIR had a definite fault. Meanwhile, the timer circuit was working fine.

I traced the PCB track carrying +12V to a 2.2Ω surface-mount resistor, but there was no 12V at the other side. Why a 2.2Ω resistor in the power feed? I never found out! I replaced it with a wire link but there was still no activity.

A check with the meter showed the 5V relay was getting power and the contacts were closed. On removing power the contacts opened. I found it interesting to note that one

side of the relay coil was at 12V and the other side was held at 7V (non-alarm state).

The relay had SPST NO contacts and the PIR terminal block was labelled NC — i.e., the relay should be NC with power on in the non-alarm state.

I then pulled the relay-driving transistor and it checked out OK, with no shorted legs. "Why won't it trigger?" I thought. "Hope I haven't sparked the 18-pin SMD IC!"

With no schematic and a three-layer board (getting closer to the bin every minute), I was clutching at straws. I removed one of the three electros and found a speck of discolouration on the board and the bottom of the electro bulging out. Better still, it measured a steady 30kΩ on the analog meter.

"Unbelievable!" I thought, as I replaced it with a spare 100nF cap, applied the power and it was back to business as usual.

So today it looks like a trip to the Jaycar store, for a 100uF cap small enough to fit inside the PIR case (the original was 6mm diameter and 5mm high, 6.3V). Hmm, might grab replacements for the other two caps while I'm there, and a 5V relay with NC contacts would be much more suitable for the 555 timer circuit.

Thanks for that little anecdote, Ian. Now we have learned a bit more about PIR detectors, to add to what we learned in the previous story.

You didn't explain the confusion over the

relay contacts, but I suspect that someone had changed the relay at some time in the past. Many larger relays have two sets of contacts so that they can be used NO or NC, as required. But miniature types dispense with the luxury of dual-purpose contacts, and changing the whole relay is the only recourse if the alternate contacts are required.

There are so many of these PIR detectors around nowadays, and although they are not all that expensive to replace, being able to effect simple repairs on site must impress the customers.

Come to think of it, that last comment is the best argument I can think of for servicing at component level. A lot of boards cost in excess of \$50 and if they can be repaired in under an hour, that must represent a profit of some sort!

Of course, the skill lies in determining which components are at fault in the shortest possible time. As Ian's story shows, electrolytic capacitors are the most likely offenders and should always be the first thing to be examined.

Thanks for that story Ian, and I hope that your 'Granny Detector cum Workshop Protector' does its job for you, for years to come.

Well, that's all for this month. But next time I have for you the most amazing Remote Control story you'll ever hear. Watch for it! ♦



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400VA Cat. MP-3095 **\$249**
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Power output 200W RMS/4Ω, 150W RMS/8Ω. See catalogue page 52 for full details. Cat. AA-0505



**May
\$399**

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**NEW
Z-99**



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Kit includes: •Soldering tool, safety cap with flint ignition and 2.4mm soldering tip •Flame torch tip •5mm hot air tip •Hot knife tip •Aluminium tray with wetting sponge •Aluminium tray for hot tips etc •Carry case with locking clip, powder coated steel.

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Cat. TS-1260

STAINLESS STEEL FASTENERS BARGAIN PACK

You may never buy a machine screw or bolt again! We purchased a whole factory load of goods last year. Most of the stuff was electronic and it has been offered to you already. We even exported some of the stock. In some ways we left the best offer of the lot until last.

Included in the buy was over 3 tonnes of high grade stainless steel metal thread screws and bolts. We have finally got around to sorting them and have decided to make a fastener pack to end all packs.

WHAT YOU GET (inside the outer pack)

SUBPACK #1 This consists of over 600 (yes, 600) metal thread screws. They range from about 2mm in diameter to 5mm in diameter 6-25mm long. Most are metric thread, some UNF, Posidrive, Phillips, UNBRAKO-type & countersunk slotted. Almost all are 304 or 316 grade stainless steel. Some may be other S/S grade.

SUBPACK #2 This consists of around 100 metal threaded bolts from about 5mm dia to 8mm dia, from 8-45mm long. Once again most are metric thread but some are UFC & UNC. Heads range from Unbrako, countersunk, hex, pan type with Phillips, Posidrive or hex drive.

SUBPACK #3 This pack consists of bolts 8 - 15mm dia, UNBRAKO or hex heads, 6 pcs approx.

SUBPACK #4 A bag of over 100 nuts & washers. Sizes range from the very small to very large, metric, UNF & UNC. Most washers are 316 metric grade stainless. Please note: We have described the contents above in terms of "packs". The actual bag will contain all of the hardware described above, but the parts may be mixed together.

BONUS We'll also chuck in a monster bolt, 15 to 25mm in diameter! The pack weighs almost 3kg!

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Cat. CS-2268

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Cat. QM-7212

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This Hi Tech advanced tester allows you to safely, quickly and accurately check for the following: •AC Voltage Test •DC Voltage Test - 1.5 to 250V •Continuity Test - 0 to 100MΩ •Polarity Check •Electronic Component Test •Hi/Low Sensitivity Switch •Built-in Self Test •Safe - No current flows through ones body. •See cat page 32 for full details. Cat. QP-2260

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Now you can be notified whenever a door or window is opened with a pleasant sounding chime. The chime unit itself is powered by a single 9V battery and triggered using a reed/magnet assembly. Reed switches are incorporated on both sides of the chime for left or right hand magnet triggering.

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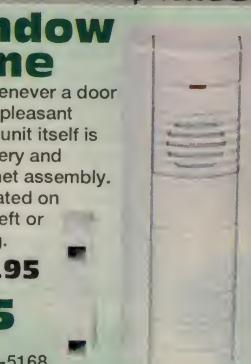
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Cat. XL-2510

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WITH 2 WAY CROSSOVER AND REMOTE SUB VOLUME CONTROL. This unit has 15 separate left & right adjustments starting at 25Hz allowing the installer to correct any unwanted peaks and dips. It also includes a 18dB Octave crossover, input and out level controls and peak indicators, a delay turn on option, and dash mounted remote sub woofer level control. Its low profile would allow installation under a seat

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Our normal price for these is \$2.25 each. We've made a bulk surplus deal, and can offer these at well below normal price.

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for details. Cat. AV-6415
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See 98 Cat. page 120.

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For full details see catalog P35

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	25mm
	6.5mm
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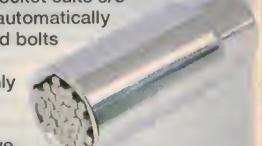
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RTN's Basic Stamp Boards and Modules

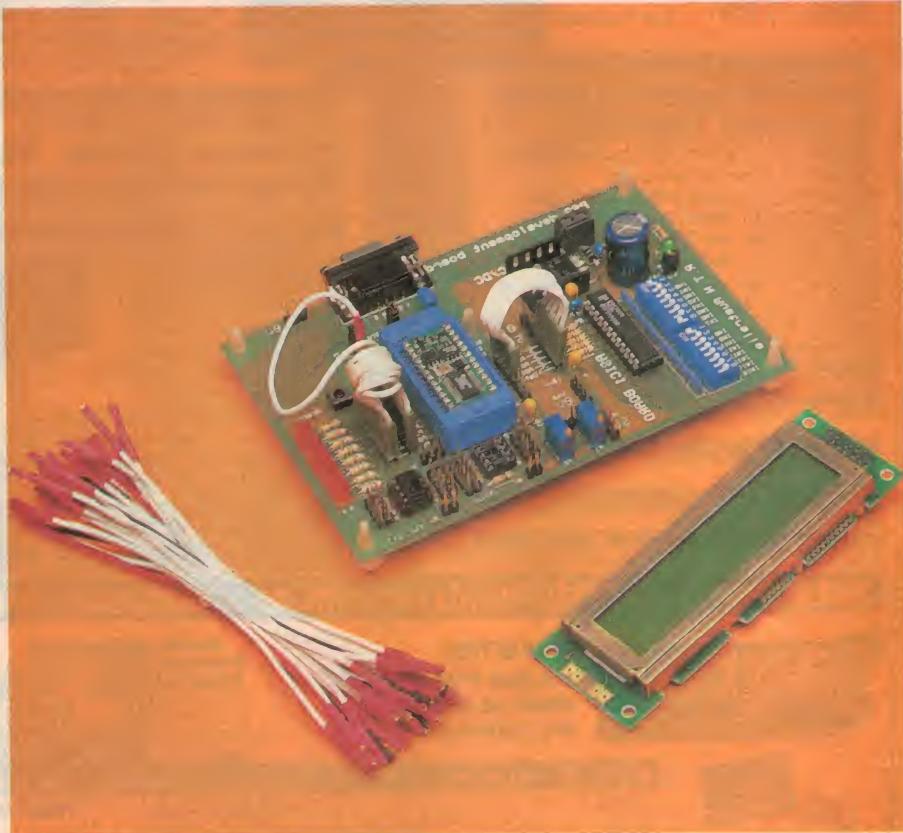
Melbourne-based company RTN offers a cost-effective range of easy-to-use Basic Stamp microcontroller boards, plus a wide variety of matching development boards and add-on assemblies. Whether you're familiar with microcontrollers or just thinking about getting into this fascinating field, RTN's Stamp products are well worth a look.

by Rob Evans

UNLESS YOU'VE BEEN hiding under a rock or haven't been reading past issues of EA, you've no doubt heard of the clever BASIC Stamp range of microcontrollers devised by Californian-based company Parallax. What you may have missed though, is the significance of these little controllers to hobbyists and professionals alike, thanks to the very quick and simple way they're programmed.

In a nutshell, the truly unique aspect of the BASIC Stamp is indicated by its name: the fact that it can be repeatedly programmed in the simple BASIC language — actually a slightly specialised version called PBASIC. This in turn means that those of us not familiar with the assembler code or high-level language needed for conventional micro programmers can get a Stamp-based project up and running in no time, by just knocking out a few lines of PBASIC on a PC.

The 'P' in PBASIC in fact refers to Parallax, who came up with the clever idea of programming a conventional PIC microcontroller (from Microchip) with a BASIC interpreter that reads from an on-board EEPROM, which in turn holds your (tokenised) PBASIC instructions. With this simple but effective arrangement, a Stamp module becomes a microcontroller in its own right — even though it *itself* is based on a PIC micro — which can be repeatedly and quickly programmed from your PC. There's no hardware programmer involved either, since Stamp's programming input simply connects to a PC's standard serial or parallel port, where the instructions are simply 'downloaded' into the module's EEPROM.



RTN's BS2 development board is a very convenient way to develop Stamp-based projects. The 'full version' of the board shown here is fitted with a BS2-IC module, while the bundle of leads are used to interconnect the various sections.

The end result is a modest, but very easy to use micro offering eight configurable I/O lines and programming space for around 80 PBASIC instructions — as set by its 256-

byte on-board serial EEPROM. With a processor (PIC chip) clock speed of 4MHz, the Stamp can handle a moderate 2000 instructions per second, however it only

takes a second or two to download a new program from your PC. This last aspect is very appealing of course, since program changes can be made, then the effect immediately reviewed on the micro itself — great for fast development work.

The above specifications refer to the BS1 Parallax Stamp module by the way, which was originally based on conventional DIP chips (BS1 version D) and later evolved into the compact BS1-IC type using surface-mount ICs. Further development then produced the much-upgraded BS2 style, which is also available in two forms: the BS2-IC and the impressive new BS2-SX. These later versions offer extra PBASIC function commands, much faster clock and instruction processing rates, larger EEPROM programming space, double the number of I/O lines (16), and two dedicated serial I/O lines.

The SX version is no longer based on a Microchip PIC micro, and now uses a Scenix device running at 50MHz. This helps the BS2-SX bolt along at an impressive 10,000 instructions per second. It also offers extra PBASIC commands, eight times the programming space and 64-bytes of scratchpad RAM.

During the years of Stamp module development, a small but healthy support industry has grown around these popular micros, with companies such as RTN supplying prototyping boards and systems for interfacing with the outside world. As a result Stamp modules can be found in the full spectrum of microcontroller applications, from educational fun right through to critical control systems in industry.

In short, BASIC Stamps are a great way to get into microcontrollers, thanks to their low cost and very simple programming method. They're well supported by both Parallax and companies such as RTN, who offer wide range of information on their respective websites — you can even download suitable programming software, plus the full user manual...

Starting out

If you're new to microcontrollers, RTN offer a number of very low-cost Stamp systems to get you going with minimal outlay. RTN's budget BS1 module, based on conventional DIP chips (similar to the original Parallax BS1) is particularly good value at \$45, with the parts package (less PCB) available for under \$25.

We were extremely impressed with this budget-conscious approach by RTN, who also indicated that a kit version of the BS1 module (including PCB) could be offered for about \$30. If you don't mind putting together a simple kit and arranging a few I/O connections, this is an ideal approach for those starting out. Spare ICs are available too, in case of disasters.

Moving up the scale, the next step is the Parallax BS1-IC module, which uses surface-mount components in a compact 14-pin inline (SIP) module. This is priced at \$63, offers a built-in 5V regulator, but is otherwise equivalent to the budget BS1 module.

While both types of BS1 modules can be used in their own right by simply making connections directly to the pins, the neatest approach is to make the I/O and power connections via a matching 'carrier' or development board. RTN offers the Parallax carrier

plus RTN's own ASIC1 multiplexer chip — a 24-pin PLD device that expands five Stamp I/O lines into 16 inputs. Also, like the simple carrier boards, it offers a general matrix area for free-form circuitry.

All in all, RTN's BS2 development board is very well thought out and should be ideal for first-time experimenters and serious project developers alike. The basic version of the board is priced at around \$60, and holds a conventional 24-pin DIP socket to suit the enhanced BS2 Stamp module.

"...you don't need to spend hundreds of dollars to sample your first taste of the fascinating world of micros."

boards for the BS1-IC and BS2-IC modules at \$32.20 and \$33.55, respectively, but also promotes their locally-designed BS2 development boards.

Unlike the small carrier boards, which offers the basic connections plus a matrixed prototyping area, RTN's BS2 development board is quite an elaborate affair that can support components for all but the most ambitious Stamp-based projects. Available in three versions, the most basic setup offers a regulated 5V power supply, DB9 serial socket (for programming and general serial I/O), a reset switch, an 8-way DIP switch (to set input states), plus eight output LEDs with limiting resistors.

The board also features a range of IC socket holes and trackwork that can accommodate other peripheral devices such as A/D converters, op-amps, additional EEPROMs,

As it turns out though, this board also suits RTN's low-cost BS1 module, which has been cleverly arranged with a series of connecting pins extending below the PCB. These are aligned in the correct 24-pin DIP format, so it too can drop into the BS2 development board.

So you don't need to spend hundreds of dollars to sample your first taste of the fascinating world of micros. For a cost of about \$90, you can start off with the RTN BS1 module kit plus their basic development board, then just expand and improve the system as your needs grow. On the other hand, if you're determined to spend the least possible cash and don't mind the extra work, you could always just go for a \$25 parts kit and a piece of strip board...

Moving on

If you're already experienced with Stamp micros or you'd just prefer to start off with a more capable system, the Stamp BS2-series modules and RTN's higher-level development boards are the way to go. RTN offers the BS2-IC module for \$107.35 and the new high-performance BS2-SX version for \$120, but as with all prices mentioned here, we'd recommend checking RTN's website (mentioned at the end of this article) for the latest information.

To accommodate more ambitious prototyping and development, the mid- and full-versions of the RTN BS2 development board are equipped with a range of extra peripherals and features. Both are fitted with a 24-pin ZIF socket so the Stamp modules are easy to change, and the \$80 mid-version is supplied with a TLC0831 serial A/D converter chip plus input DIP switches.

Priced at \$110, RTN's full-version BS2 development board has all the bells and whistles. Along with the features of the mid-range board (ZIF socket, A/D converter and so on), it also offers 16 inputs courtesy of

RTN's BASIC Stamp products

A wide range of Stamp modules and accessories, plus locally-designed development and interface boards.

Good points: Low-cost Stamps available for those starting out. Effective, well thought out development boards.

Bad points: With so many Stamp options and different add-on boards available, it can all get rather confusing...

RRP: From \$25. About \$90 for comprehensive development setup (see text).

Available: From RTN via mail order, to 35 Woolart Street, Strathmore 3041. Phone (03) 9338 3306. See their website at <http://people.enternet.com.au/~nollet> for product information, prices and contact details.

RTN's ASIC1 input expansion chip, plus the full complement of IC sockets and header pin connectors. All versions of the board are fully assembled, by the way, and are supplied with relevant application information and programming code samples.

More than toys

While the founding concept of the Basic Stamp series is a microcontroller that's simple to program and get going, don't be fooled into thinking that it can only flash LEDs or be configured as a timer or alarm setup. The PBASIC programming language is simple enough, but this certainly doesn't mean that the Stamp can't perform sophisticated tasks — particularly when hooked up to suitable interface modules and out-board gear.

In this respect, RTN cater for real-world Stamp applications by stocking a range of I/O interface boards (opto, relay, etc), specialised driver and interface chips (LCD, stepper motor, etc), plus pre-built industrial controller boards designed to take Stamp modules.

We had the chance to check out RTN's neat PIC-based LCD interface board, by way of example. This converts serial data (say, from your Stamp module) into a standard parallel format compatible with off-the-shelf LCD screen modules, and worked very well with the supplied 2 x 20 character LCD screen. RTN have a rather neat LCD kit priced at around \$60 by the way, and this includes the LCD interface board plus a compact 2 x 8 character LCD display module.

So while Stamp modules have limited capabilities when compared with most directly-programmed microcontrollers, this is largely offset by their simple and quick programming system, the unrestricted read/write capability, plus of course the large range of supporting hardware that's currently on the market.

There's plenty of help available too, with the internet offering a huge resource of Stamp programming code and application details. Whether it's an industrial lift controller, a complex signal routing system, or real-time multiple-motor speed controller, someone out there has probably done it with a BASIC Stamp...

All in all, we're very impressed with the range and quality of the Stamp products available from Parallax distributor RTN, and in particular, with the price of their Stamp starter modules and kits. For information on their current range and prices, plus a host of other useful data, point your browser to RTN's website at <http://people.einet.net.com.au/~nollet>. ♦

A Stamp for your thoughts!

Thanks to the generosity of Parallax distributor RTN, we have hundreds of dollars worth of Stamp products to give away to EA readers who can come up with an original - and of course practical - idea for using a Stamp microcontroller module. We're looking for ideas that rise above the obvious timer and alarm applications, and are particularly keen to see those that make the most use of the BASIC Stamp's capabilities. So if you have an original and interesting application for a BS1- or BS2-type Stamp, send it to us here at EA via post, fax or email, and we'll then pick the best three ideas from the bunch. This offer ends on the 30th of June 1999, so put on your thinking cap - that's the one with the microprocessor-controlled propeller - and get with it!

Here's the list of prizes, for inspiration:

FIRST PRIZE - valued at \$360

*BS2 development board - full version, with power pack
BS2-I2C Basic Stamp microcontroller
LCD interface kit - with 2x5 char LCD display
Stamp user manual - v1.9 (latest version)
Serial programming cable
Programming software and user manual on disk*



SECOND PRIZE - valued at \$230

*BS2 development board 'Skeleton' version
BS2-I2C Basic Stamp microcontroller
LCD Interface Kit - with 2x5 char LCD display
Serial programming cable
Programming software and user manual on disk*



THIRD PRIZE - valued at \$100

*Solderless prototyping breadboard
BS1 'Stamp on a budget' module
Parallel (3-wire) programming cable
Programming software and user manual on disk*



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READER INFO NO. 11

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- Rod Humphris, Principal Teacher, RMIT
- "Max truly knows his stuff, his book 'CD Player Servicing' is brilliant in its presentation and content and a must for anyone in the technical area who wants to know about CD Players"
- Peter Murray, EFIL

Booking fee is \$295 which includes a copy of his book, all day refreshments, and lunch. Bookings close on 11th June, 1999, places are limited so hurry. (Flight & accommodation packages available). For a booking form, Seminar agenda, or more information visit his website at:
<http://home.primus.com.au/maxp/home.htm> or call +613 9384 1951.

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READER INFO NO. 12

Surround Sound Decoder with Digital Delay

Here's a low cost analog surround sound decoder which enhances normal stereo signals by extracting the 'hidden' front centre and rear 'ambience' channels, along with dual-polarity signals to drive a subwoofer amp. Importantly it also offers an adjustable time delay for the rear channel, that adds significantly to the surround sound effect — making it great for home theatre use.

by Graham Cattley

AT LONG LAST, DVD players have finally started to appear on the shelves, and with them people are starting to experience the significant advantage of surround sound in a home theatre setup. Or those who have the money to spend on the appropriate digital surround sound decoder will, at least. If you look at the back of a low- to mid-priced DVD player, though, you are more than likely to find just a pair of stereo audio output sockets, along with a separate output to drive an external digital surround decoder.

This means that in order to enjoy the wonders of surround sound, you are going to have to fork out a insignificant amount of money for the appropriate decoder, or else listen to your movie in normal everyday stereo. There is a simple and effective solution though: build your own analog surround sound decoder and save yourself a packet.

We presented just such a decoder project back in May 1994 called the 'Economy Surround Sound Decoder', designed by our editor Jim Rowe. This project was very popular, as it implemented the Hafler technique (see box) and gave quite a respectable surround sound at a low cost. From the feedback that we received from readers though, there was only one slight drawback: it didn't incorporate a time delay in the rear 'surround' channel. Feeding the rear channel through a time delay of around 20 milliseconds tends to further enhance the 'surround' effect, and that's why a lot of surround sound decoders include such a delay circuit.

Of course it isn't just DVD players that can use the decoding system — any stereo sound source will benefit from surround sound, and so this project will suit CD players, VCRs, laserdisc players, turntables — even radio!



There are only two controls on the front panel — a pushbutton for adjusting the time delay, and a master volume control that sets the output level for all five channels.

Digital delay

This project, with the rather long title of 'Surround Sound Decoder with Digital Delay' is essentially the original 1994 Economy Surround Sound Decoder with an added digital delay. The delay circuitry is based on a common digital delay IC, and a single front panel control allows you to select a rear channel delay of 0ms, 15ms, 20ms, 25ms or 33ms — the longest delay that the chip can handle.

While a time delay is often used to create an echo effect, it can also add a feeling of spaciousness to the recording. Surprisingly however, this isn't the main reason that a delay is used in surround sound systems. It is usually used to improve the direction and clarity of the front channels, by taking advantage of the 'Haas' or precedence effect. The sound is a lot more focused in

front if the rear channel is delayed slightly, as happens in real life. As sound travels at around 25-30cm per millisecond in free air, an adjustable delay will let you tune your system match your listening environment.

The circuit

The circuit falls rather neatly into three main sections: the digital delay circuitry, the surround sound decoder itself and the power supply. I'll start with the digital delay circuitry, as it is by far the most complex part of the project.

The delay is based around the Mitsubishi M65830 delay IC, which contains D/A and A/D converters, 16Kb waveform storage and both input and output low-pass filtering. It is capable of delaying an audio signal anywhere from 0.5 to 32.8ms, with the delay value programmable via a serial data port.

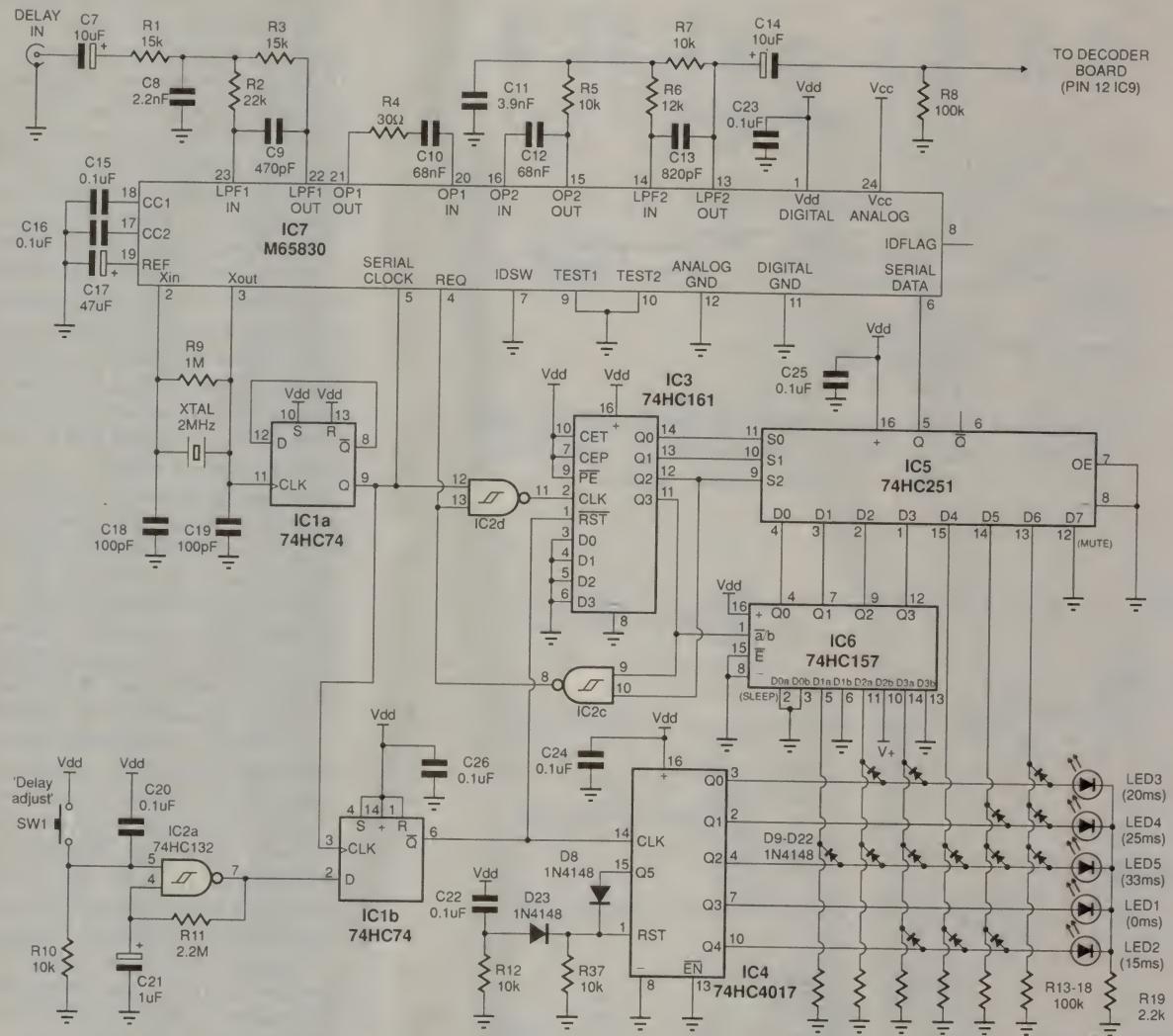


Fig.1: The digital delay side of the decoder, with IC7 doing all the hard work. The various delay periods are set by pressing SW1, with the appropriate bit pattern sent to the delay IC by IC5.

This is fine if you want to use some form of microcontroller to perform the programming functions, as the various control codes and data can be generated and sent via a single serial link to the delay IC. However we didn't want to tie this project down to a microcontroller, with all the complications that that would entail, so we've done the same job with a few discrete ICs.

IC1-IC6 perform the function of producing five separate, pre-programmed bit streams to configure the delay IC with the required delay settings. Table 1 shows the five bit pat-

On the left are the left and right input sockets, with the L and R outputs available on the right along with the subwoofer outputs, centre (front) and rear surround channels, and the delay sockets.



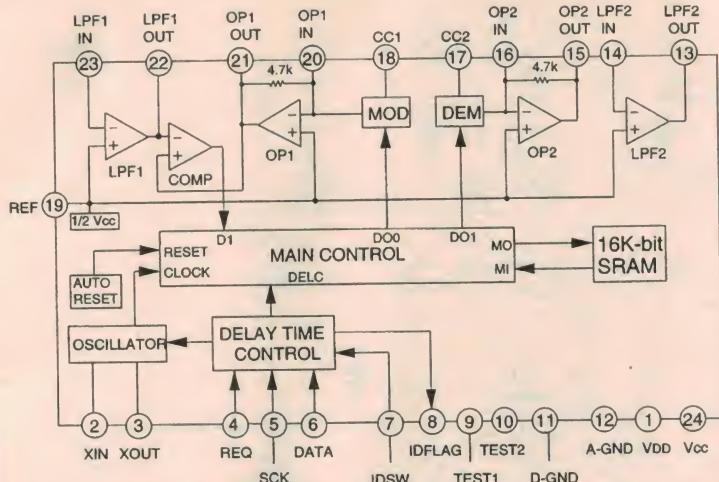


Fig.2

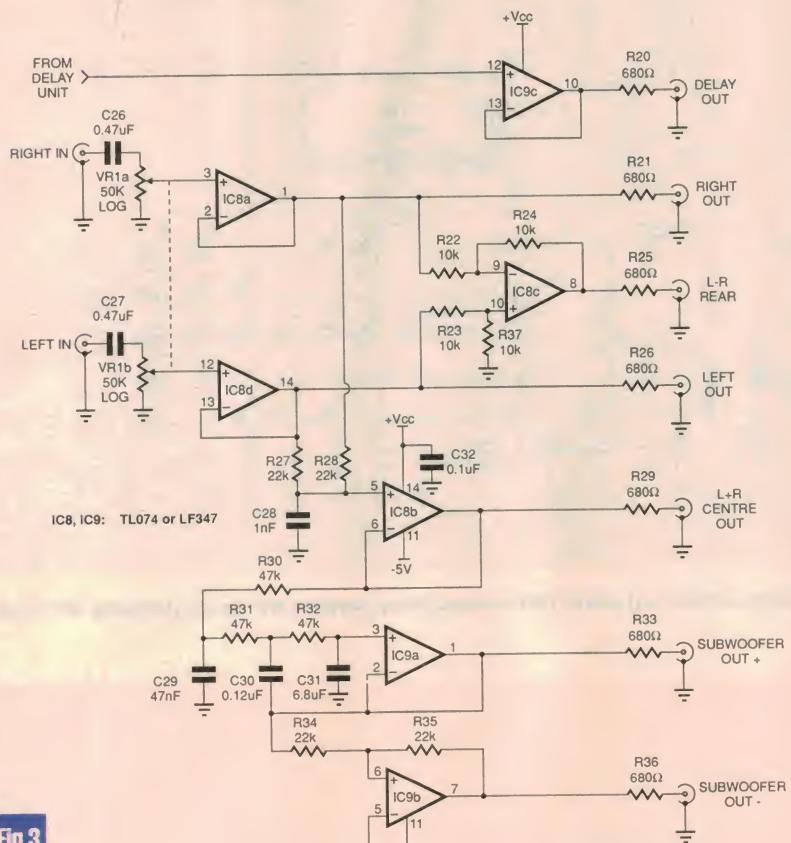


Fig.3

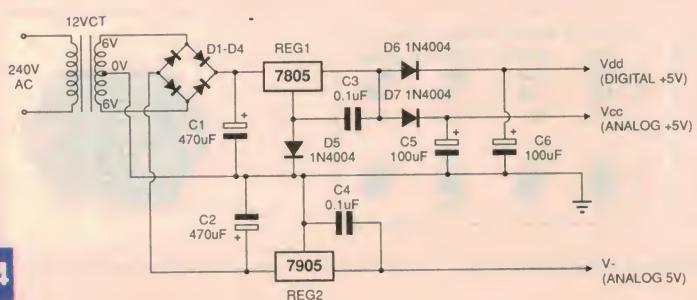


Fig.4

terms that we want to generate, along with a description of the function of each bit.

The digital side of the delay circuit breaks down into a number of sub-sections, which I'll briefly cover now to aid description later. IC2a debounces the 'Delay adjust' pushbutton SW1, and also gives an auto repeat function if the button is pressed and held. IC1a and IC1b process the circuit's clock and also synchronise the debounced button signal with the clock, to provide reliable operation.

IC4 provides indication of the selected delay time, as well as selecting the required bit-pattern via the diode matrix D9-D22. This bit-pattern is picked up by the two cascaded multiplexers IC5 and IC6, and is clocked out to the delay chip IC7 by the 4-bit binary counter IC3.

That's the whirlwind tour of the circuit, now I'll cover the details.

The best place to start describing the operation of the bit-pattern generator section of the circuit is with the crystal oscillator, based around pins 2 and 3 of IC7. This runs the delay section of the chip at 2MHz; we tap off the clock signal from pin 3, and feed it into IC1a configured as a toggling flipflop. This produces a 1MHz clock on its Q output (pin 9), which is used to run the rest of the circuit.

IC1b serves to synchronise the debounced switch signal from IC2a — because the user could press the button at any time and we need the switch signal to start on the rising edge of a clock cycle. The Q-bar output of IC1b therefore presents a clean, synchronous pulse to the clock input of IC4 every time the 'Delay adjust' pushbutton is pressed.

The pulse from IC1b enables (that is, it ceases to reset) the binary counter IC3, which then starts counting from 0000 to 1100 (0 to 12). As soon as the 12th count is reached, both Q2 and Q3 of IC3 go high, bringing pin 8 of IC2c low. IC2d now blocks the clock signal to the counter, which freezes it until it is reset again by the next button press.

As well as resetting the counter, the pulse from IC1b also clocks the decade counter IC4 once, causing it to advance to its next output, and lights one of the five LEDs to indicate the currently selected delay. IC4's output also activates one row of the diode matrix, which presents a combination of six highs and lows to the inputs of the two multiplexers IC5 and IC6. These highs and lows correspond to the data section of the bit-stream (D1-D6), with the other (unchanging) bits hard-wired to the multiplexers' remaining inputs.

Logically, to send the 12 bits of data to the serial input of IC7 we'd use a 12 input to 1 output (12-to-1) multiplexer. Unfortunately, the largest multiplexer around is an 8-to-1, meaning that we'll have to pull a subtle trick in order to merge in the extra four bits of data. This is done by 'cascading' a second quad 2-to-1 multiplexer to the first four inputs of IC5.

Thus the first four bits 'read' are D0a,

D1a, D2a and D3a (pins 2, 5, 11 and 14 of IC6). The next four bits are read normally from pins 15, 14, 13 and 12 on IC5, but you may have realised that we've now run out of inputs on IC5!

Now (and here's the trick) during the first eight counts, Q3 of IC3 has been low. As soon as we hit binary 1000 (the ninth count — remember that we start from zero), Q3 swings high. This switches IC6 over to its *other* set of inputs, and so the last four bits are read in from D0b, D1b, D2b and D3b (pins 3, 6, 10 and 13 of IC6). The counter stops on the 13th count, and so we have clocked in the 12 bits of data, including the newly selected bit pattern for the desired delay.

Fig.2 shows a block diagram of the delay IC and as you can see, the analog side of IC7 consists of a number of op-amps used for delta modulation and output filtering. For this project, we've gone for a Butterworth low-pass filter on the chip's analog input (pins 23 and 22), rolling off at around 10kHz.

R4, C10, C15 and C16 (pins 21, 20, 18 and 17 — see Fig.1) set the response parameters for the delta modulation, and the delayed, de-modulated and buffered audio finally emerges on pin 15. It is then passed through a second-order low-pass filter, this time set to roll off at 8kHz — a standard upper corner frequency for the surround channels (also done in ProLogic decoders by the way), and one that prevents any artifacts from the digital to analog decoding from getting through to the output.

The final delayed and filtered signal then passes through the 10uF decoupling capacitor (C14) to IC9c, a unity gain output buffer located on the surround sound decoder board and driving the 'Delay out' socket on the rear panel.

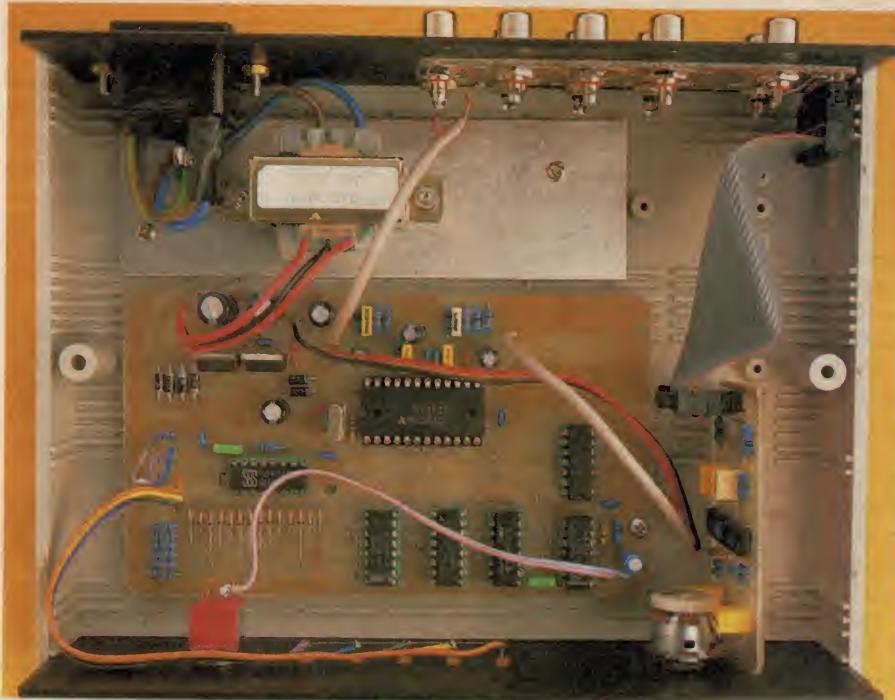
Surround decoder

The actual surround decoder circuit is quite straightforward, and is based on only two TL704 quad FET op-amps as seen in Fig.3.

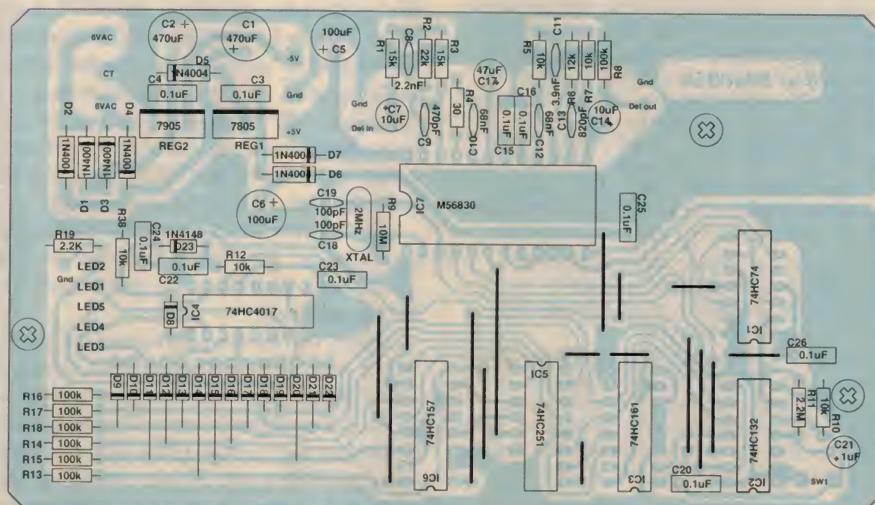
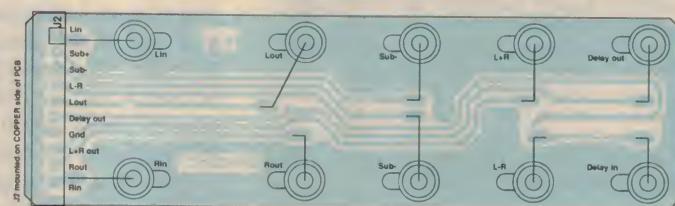
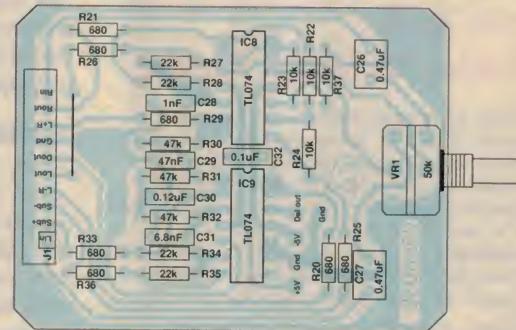
The incoming right and left stereo signals are fed through coupling capacitors C26 and C27, and then to the master volume control VR1a/b. The signals are then passed through IC8a and IC8b, connected as unity-gain buffers. These buffered outputs are then fed via R21 and R26 to the decoder's 'Right out' and 'Left out' connectors on the rear panel, to drive the left and right front channel amplifiers.

The L+R (Front centre) signal is derived from the left and right inputs by summing resistors R27 and R28, with IC8b operating as an output buffer. The 1nF capacitor C28 is used to reduce the bandwidth of the resulting signal to around 7kHz, so that any disturbance to the stereo image is minimised.

The essentially mono output of IC8b is also used to derive the subwoofer signal, via op-amp IC9a. Resistors R30-32 and capacitors



(top) the internal wiring and positioning of the circuit boards is shown above, with the component overlays for the three PCBs at right. Note that the 20-way header on the rear panel PCB (below) is mounted on the copper side of the board.



C29-31 are used to form a third order low-pass filter, with a corner frequency of 100Hz.

Finally, op-amp IC9b is used as a unity-gain inverting buffer, to produce an out of phase or inverted version of the subwoofer signal. The idea of this additional output is that it allows a spare and otherwise standard stereo amplifier to be used as a higher power 'bridge mode' mono amplifier to drive your subwoofer. Of course, if you already have a reasonable subwoofer amplifier you can simply drive it from the Subwoofer positive output alone.

The L-R 'Rear' signal is derived from the left and right channels by IC8c, which is connected so that it simply subtracts one channel from the other. Resistors R22 and R24 give the stage a gain of -1 as far as the right signal is concerned, but as these also give it a gain of +2 for the signal at its non-inverting input, resistors R23 and R37 are used to restore the gain to unity for the left signal as well.

The final output from pin 8 is therefore L-R, as desired. This signal appears on the rear panel as the 'Rear' output, but it is also linked across

The Hafler Matrix Decoding System

There have been designs for surround sound decoders in the past, but these tend to be large designs involving multiple microprocessors, and complications with licensing agreements to use the specialised ICs. Instead of this rather complex approach, there is a far simpler method that gives results that are often just as good, known as Hafler matrix decoding.

Based on the analog subtraction and addition system developed by US engineer David Hafler back in the early 1970s, the basic idea is that, although normal stereo audio consists nominally of only two signals, there's really a third signal present. This is the 'ambient' or surround information, which presents as differences between the main signals conveyed by the left and right stereo signals.

By simply subtracting one main stereo signal from the other, we can separate out this 'L-R' surround information and use it to produce a more realistic re-creation of the original sound field. Extending the system a little further, we can add the two stereo signals together, to produce an 'L+R' or mono signal, which can be used to drive a 'front centre' speaker. This extra channel helps to fill in the 'hole' that can often be apparent in some stereo material that has exaggerated channel separation.

The same L+R signal can also be fed through a low-pass filter to drive a subwoofer, giving enhanced reproduction of very low frequencies.

The Hafler matrix system is actually the basis for the Dolby ProLogic surround sound system, although the latter uses digital signal processing for enhanced results. But the basic Hafler system is still capable of surprisingly good results.

to the input of the digital delay, as in 99.9% of cases you'll want to delay this rear channel.

All seven outputs from the surround sound decoder board are buffered, and are current limited by 680Ω resistors. These buffers provide relatively low impedance outputs (essentially that of the 680Ω resistors), to minimise any possible degradation due to the capacitance of connection cables.

Power supply

The digital delay side of the project runs off a standard +5V supply, as does the analog decoding circuitry. In an effort to prevent digital hash from the delay board from appearing in the output signal, a pair of diodes is used to isolate one 5V supply from the other.

Fig.4 shows the complete supply, with the positive 5V regulator REG1 supplying both the analog (Vec) and digital (Vdd) positive rails. As this system of isolating one rail from the other results in a 0.6V voltage drop across each isolating diode, we compensate by artificially boosting the regulator's output by an equal 0.6V, by adding another diode (D5) in the regulator's common lead. The negative supply is only used by the op-amps on the surround sound decoder board, and so this part of the supply circuit is fairly conventional.

Construction

Start construction with the larger digital delay board, and the first thing to do is to install the 16 links and 18 PC pins. Some of the links run quite close to each other, so make sure they don't have any kinks and that they lay flat against the board. Move on to the resistors, small capacitors and diodes, and be sure to check against the overlay diagram for their correct positioning and orientation on the board. The electrolytics are next — just be careful with C2 whose positive lead connects to ground. Again, check with the overlay diagram for the correct orientation.

I would suggest using a socket for IC7 as it will facilitate testing, so if you decide to use one, install it now. I wouldn't worry about sockets for the other ICs, but again, if you decide to use them, now is the time to solder them in. The last components to go on the board (for now, anyway) are the two voltage regulators. Be sure not to get them mixed up, as REG2 (the 7905) mounts on the left-hand side, next to the diode bridge.

You are now ready to test the power supply sections, but before you can do this, you'll have to wire up the transformer and IEC mains socket.

Mount the power transformer on a 45 x 120 x 2mm aluminium plate, with mounting holes drilled to suit the plastic support pillars in the bottom half of the case. You might like to remove any unused pillars directly under the plate with a pair of wire cutters, in case they foul against the mounting bolts used to

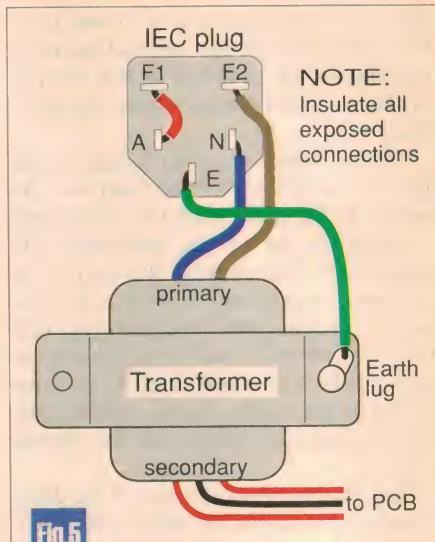
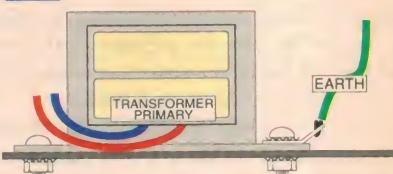


Fig.5



Above are the wiring details for the power transformer, while below are construction details for the rear panel board.

Fig.6

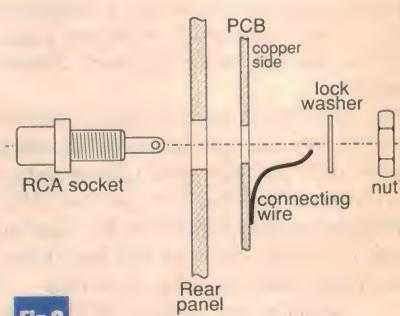
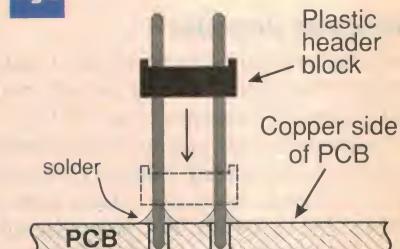
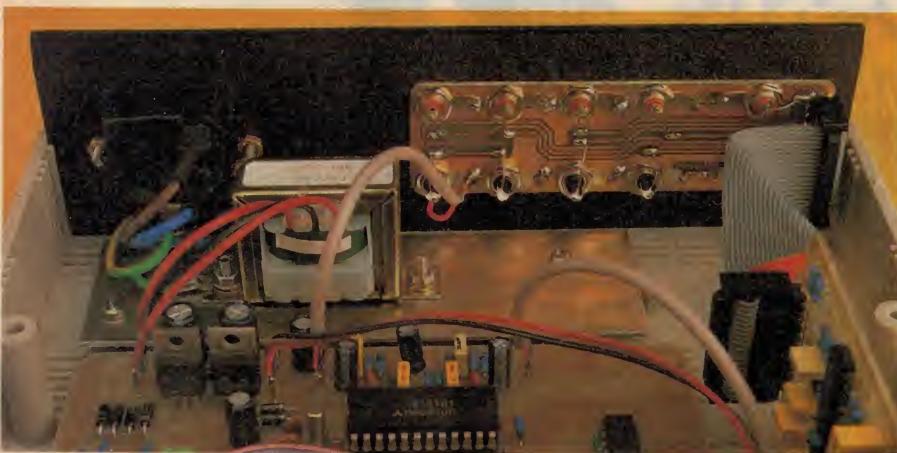
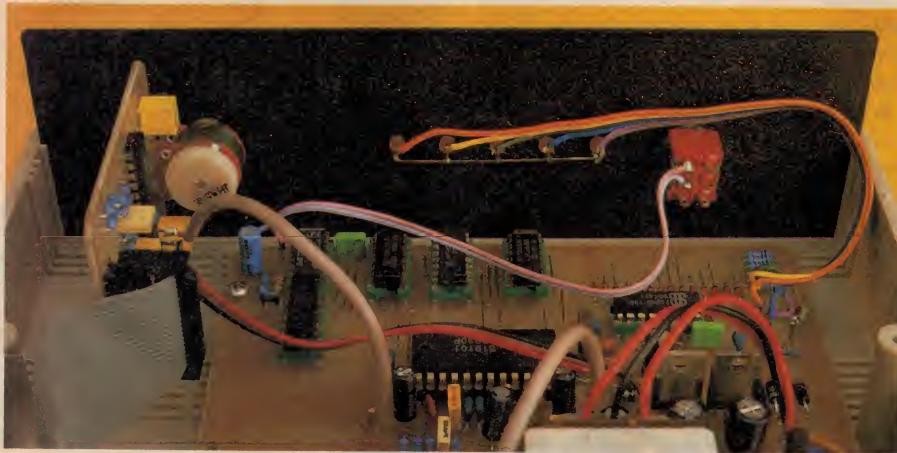


Fig.6



secure the transformer to the plate.

Unless you are using a pre-punched rear panel, you will need to cut a hole to mount the fused IEC socket, and while you are at it you can drill the ten 7mm holes for the RCA sockets as well. Use a copy of the rear panel artwork as a guide, and get busy with that drill, file and reamer...

With the IEC socket secured and the rear panel fitted into the bottom half of the case, wire up the transformer as shown in Fig.5, being sure to insulate all the mains connections securely with heatshrink or cambric sleeving. When you've done that, double check your wiring, and make sure that you followed the diagram for mounting and earthing the transformer correctly.

Temporarily secure the main PCB to the bottom of the case (again, you might like to remove any unused support pillars where they foul against the solder joints), and wire the transformer's secondary to the three PC pins at the left rear of the board. Apply power, and check that +5V (Vcc) is available between pins 24 and 12 of IC7's IC socket. Next check for +5V (Vdd) between Pins 1 and 11, and that -5V is supplied to the rear PC pin behind and to the right of the regulators.

If you are missing one or all of these voltages, switch off and unplug the mains and check the board for shorts or incorrectly

placed components. Check particularly that you've installed D1-D4 correctly, and that you haven't accidentally swapped the regulators around. (Also check that you installed

TABLE 1

Delay bit patterns

0ms:	000000000010	(0.5ms)
15ms:	000111000010	(14.8ms)
20ms:	001100100010	(20.0ms)
25ms:	000001100010	(25.1ms)
33ms:	011111100010	(32.8ms)

Bit description

Bit 1:	Sleep
Bit 2:	D1
Bit 3:	D2
Bit 4:	D3
Bit 5:	D4
Bit 6:	D5
Bit 7:	D6
Bit 8:	Mute
Bit 9:	ID1
Bit 10:	ID2
Bit 11:	ID3
Bit 12:	ID4

the fuse in the IEC socket — but you wouldn't forget to do that, would you?)

With all the voltages present and correct, disconnect and remove the PCB and install the seven ICs, taking note that IC3 is installed with pin 1 towards the front edge of the board. Double check the orientation of the ICs (particularly IC3 and IC7), and then re-mount the board in the bottom of the case.

Other boards

You can now start on the smaller surround sound decoder board, by installing the one link and the five PC pins. Follow up with the capacitors, the two ICs, the potentiometer, and finally the 20-way DIL header. This can be cut down from a standard 40-way header strip, with the other half used for the rear socket PC board, which is the next thing to tackle.

This rear-panel mounted board is used to facilitate the wiring of the 10 RCA sockets, without the need for a large bundle of shielded cables heading back to the surround board. While a little unconventional in its construction, it significantly cuts down the amount of manual interwiring, and makes the project much easier to service and repair.

Unless already done so, you'll need to enlarge the 10 holes in the PCB to accept the RCA sockets, also making sure that they line up with the holes on the rear panel. Do a test run by temporarily mounting all 10 sockets and ensure that the PCB lies flush against the inside rear panel.

The only component to be mounted on this board is the 20-way DIL header, and it is installed on the *copper* side. To do this, place the board flat on the bench with the copper side up. Insert the long ends of the header strip into the holes so that the tips are just short of flush with the non-copper side of the board.

Using a fine-tipped iron, fillet solder the pins to the pads, ensuring that the solder doesn't run too far up the pins. Once all 20 pins are soldered in, gently slide the black plastic carrier strip down the pins to sit as close to the board as possible. Fig.6 should help explain matters.

You can now solder 10 x 20mm 'stalks' of tinned copper wire to each of the pads adjacent to the RCA mounting holes. These are used to connect the centre poles of the sockets to the board. The (somewhat prickly) PC board can now be mounted on the rear panel, and held in place by the 10 RCA sockets.

If the board area surrounding each of the sockets is covered with a solder mask or lacquer coating, then you'll need to slip a star washer and solder lug over each socket before the fitting the nuts. The lugs can then be soldered to the ground plane as shown in the photos, ensuring that each socket is reliably grounded. Now it is just a matter of soldering the free end of each stalk to the centre lug of its respective socket.

Wiring up

Mount the switch and five LEDs on the front panel, and then fit the potentiometer attached to the decoder board. The board should float vertically, with the components facing to the left. Now wire up the LEDs and the switch to the appropriate points on the delay PCB, and then solder three 120mm lengths of wire from the power supply pins (to the right of the regulators) to the respective pins on the decoder board.

Crimp a 20-way IDC connector to each end of a 100mm long piece of 20-way ribbon

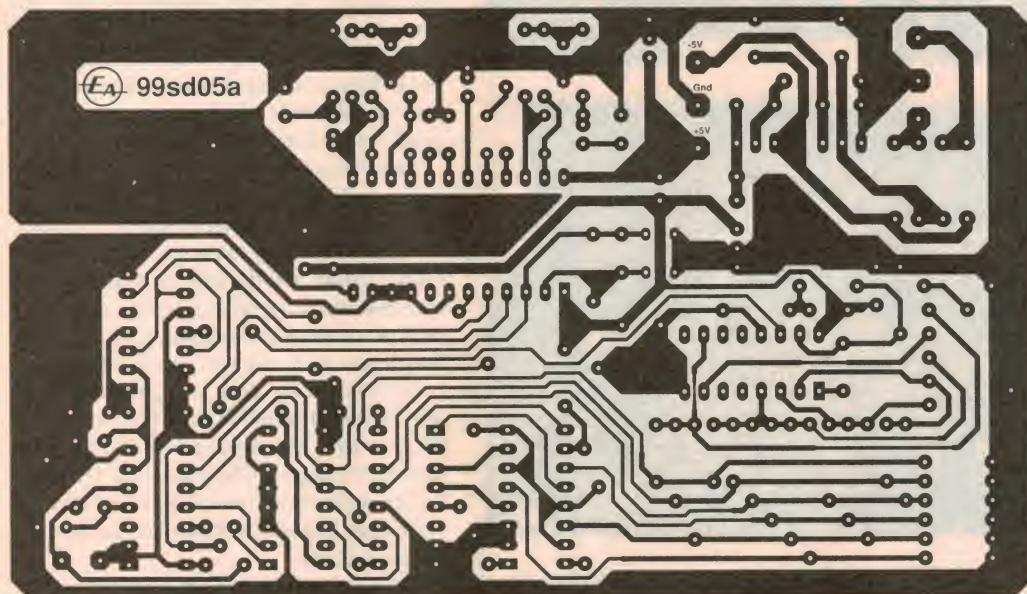
cable, and use it to connect the rear RCA board to the delay board. Note that this will require a full twist in the cable to connect pin 1 to pin 1 on each board.

Using one length of single-core audio shielded cable, connect from the 'Del in' pins on the delay board to the 'Delay in' socket on the rear panel. Another length is used to connect the 'Del out' pins on the delay and decoder board as well. The only thing left to do then is to re-connect the transformer's secondary to the delay board, and to screw the lid onto the case.

Using it

You should now be ready to connect the surround sound decoder to your amplifier system and enjoy surround sound. If you're adding the decoder to an existing stereo system, you simply disconnect the signal source (DVD/CD player, VCR etc.) from the amplifier, and connect it instead to the 'In' sockets on the decoder. The left and right outputs from the decoder are then fed back to your stereo power amp, for the main front channels.

You'll need some additional power amplifiers to handle the additional surround



Here is the artwork for the delay PCB, actual size as usual. As this board also provides the power supply circuitry, it could be used as a self-contained audio delay module for other applications.

Parts list**Resistors**

(all 5%/.25W)	
R1,3	15k
R2,27,28,34,35	22k
R4	30 ohms
R5,7,10,12,22-24,37,38	10k
R6	12k
R8, 13-18	100k
R9	10M
R11	2.2M
R19	2.2k
R20,21,25,26,29,33,36	680 ohms
R30,31,32	47k
VR1	50k dual gang 17mm log pot

Capacitors

C1,2	470uF 16VW electro
C3,4,15,16,23-26,32	0.1uF monolithic bypass
C20,22	0.1uF MKT or polyester (or monolithic bypass)
C5,6	100uF 16VW electro

Capacitors

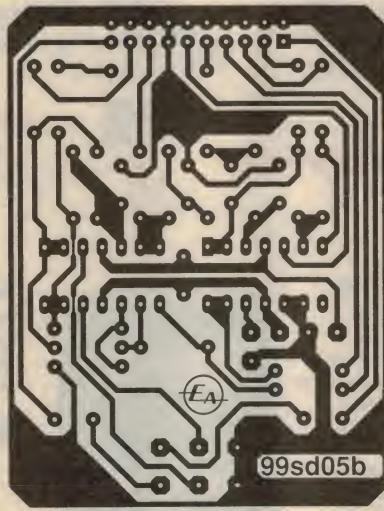
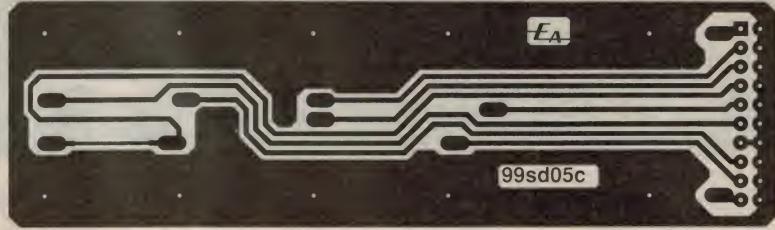
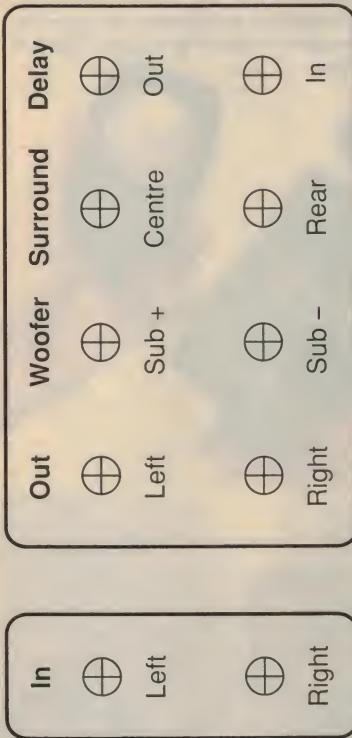
C7,14	10uF 16VW electro
C8	2.2nF MKT or polyester
C9	470pF disc ceramic
C10,12	68nF MKT or polyester
C11	3.9nF MKT or polyester
C13	820pF disc ceramic
C17	47uF 16VW electro
C18,19	100pF disc ceramic
C21	1uF 16VW electro
C26,27	0.47uF MKT or polyester
C28	1nF MKT or polyester
C29	47nF MKT or polyester
C30	0.12uF MKT or polyester
C31	6.8nF MKT or polyester

Semiconductors

IC1	74HC74 dual D flip flop
IC2	74HC132 quad 2-input NAND gate
IC3	74HC161 presetable 4-bit binary counter
IC4	74HC4017 decade counter
IC5	74HC251 8-input multiplexer
IC6	74HC157 quad 2-input multiplexer
IC7	M56830 Mitsubishi digital delay IC
IC8,9	TL074 quad JFET bipolar op-amp

Miscellaneous

J1,J2	20-way IDC header connectors
XTAL	2MHz crystal
SW1	N/O pushbutton
TR1	2851 6.3/0/6.3V power transformer
3 x PCBs: 99sd05a (135 x 79mm); 99sd05b (67 x 51mm); 99sd05c (112 x 30mm); 10 x panel-mount RCA sockets; 20mm knob; 100mm 20-way IDC ribbon cable; 2 x 20-way (or 1 x 40-way) DIL header strip; IEC fused panel mount mains socket; 250mA fuse to suit; 45 x 120 x 2mm aluminium transformer mounting plate; 250mm tinned copper wire; Mains rated and low voltage hook-up wire; 200mm single core audio shielded cable; 200 x 65 x 160mm instrument case; Mounting hardware for transformer; Heatshrink for mains connections.	

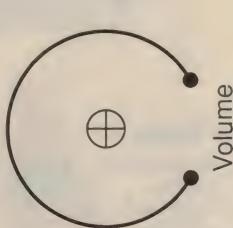


The artwork for the input and surround decoder boards are shown above, with that for the rear and front panels shown at left and right respectively. Again they're all shown actual size to make it easier for you to use them as templates.

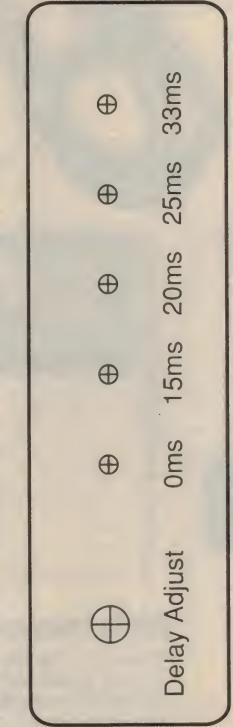
channels generated by the decoder, so if you have a spare stereo amp lying around it can well be pressed into service driving the front (centre) and rear speakers. If you intend to drive a subwoofer, you have two choices: you can connect a mono amplifier (or one channel of a stereo amp) to the '+Sub' output, and wire the subwoofer between the amp's output and ground, or you can bridge a stereo amplifier by connecting its two

inputs to the '+Sub' and '-Sub' outputs, and driving the subwoofer between the amp's two positive speaker terminals.

Because you could have up to three stereo amplifiers driving as many as five speakers, you might need to spend some time adjusting the level of each channel to achieve a balanced sound. Once these levels have been set, though, you can use the decoder's volume pot as your main system volume control. ♦



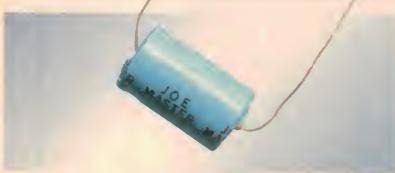
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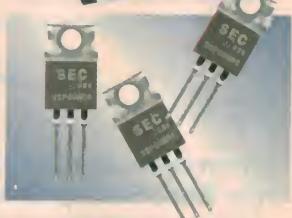
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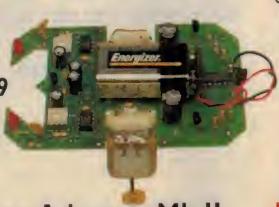
Designed from simple analogue circuitry, Cybug can sense and move away from physical objects like walls and furniture, can be light seeking (phototrophic) or light avoiding (photophobic). Comes with high quality PCB and all components.

K 3560

Battery not included

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Mar '99



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Mar '99

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K 3009

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Engine Immobiliser Mk II

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- Includes all components, case and PCB

K 4303

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Dec '98

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K 5409

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May '99



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Circuit & Design Ideas

Interesting original circuit ideas and design tips from readers. While this material has been checked as far as possible for feasibility, the circuits have not been built and tested by us. We therefore cannot accept responsibility, enter into correspondence or provide any further information.

Automatic central locking while driving

How many people lock the car doors while driving? Not many I'm sure, but a recent ordeal that my friend went through one night made me review my safety. The result? A circuit that automatically activates the central locking system whenever the car doors are shut, and the ignition is on.

Point L1 is wired to the existing door switch, while L2 goes to the ignition switch.

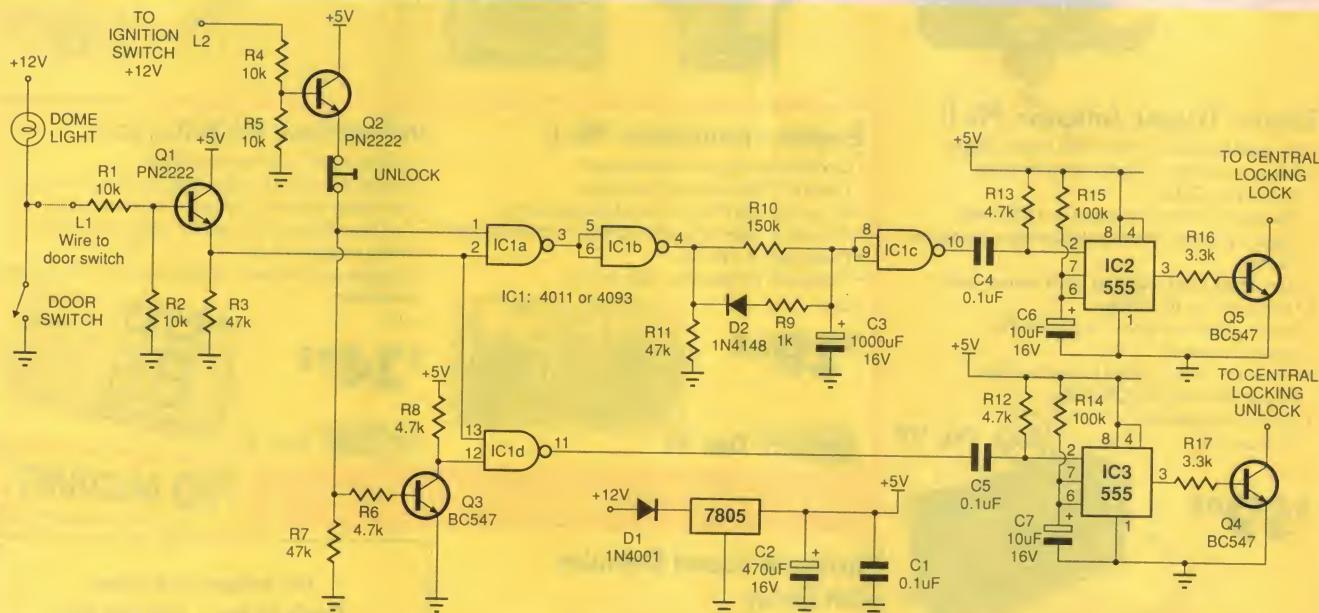
When the doors are shut, Q1 is turned on and pin 2 and 13 of IC1 go high. Now, as the ignition is turned on, pin 1 also goes high resulting in pins 3, 5 and 6 going low and the high on pin 4 is passed to C3 via R10. After 15 seconds or so, C3 charges and pins 8 and 9 swing high. The resulting negative going pulse from C4 triggers IC2, which turns on Q5 for around five seconds, locking the doors.

Q3 holds pin 12 of IC1 low, but when the ignition is turned off Q3 turns off, and the resulting pulse from C5 triggers IC3 to

instantly unlock the doors.

The switch SW1 is a normally closed type with a spring action, and is installed on the dash. It can be used as an emergency override to unlock the doors if needed. The circuit is child-safe, as all the doors have to be closed and the ignition on for the circuit to work — so please don't leave the keys in the ignition. Since making the first one, I have many happy and safe friends.

Gurbinder Dhillon
Sunshine, Vic. \$40



High efficiency LED Flasher

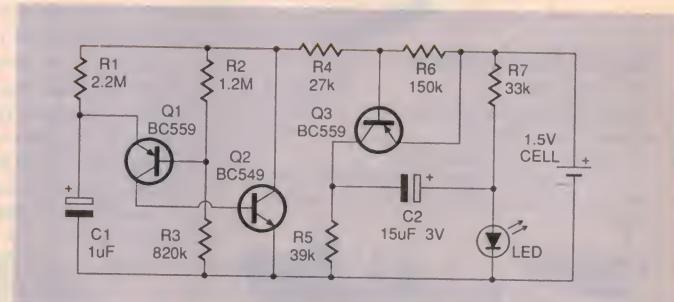
There have been many circuits published over the years for doing the simple task of flashing a LED. This one is very efficient in that it draws only about 25µA of current and only requires a single 1.5V cell as a source of power. With this power consumption it will operate for about a year on an S76 button cell and if powered by an AA alkaline cell it will operate for several years. The popular LM3909 LED flasher IC draws about 300µA by comparison.

The uses for a flashing LED are many; wherever the location of something is required in the dark or a warning needs to be given. The one I built is attached to the pull string of a ceiling mounted light switch so that the switch can be found when it is dark.

The circuit operates as follows: When power is first applied, both capacitors are discharged and all three transistors are off.

C2 charges through R7 and R5 while C1 charges through R1 towards the battery voltage. When the voltage on C1 reaches 1.2 volts, Q1 starts to turn on, turning on Q2 which causes its collector voltage to fall to about 0.1 volts. Q1's base voltage drops similarly and C1 discharges into the emitter of Q1, holding Q2 hard on.

The pulse of current through R4 and R6 turns on Q3, which connects the negative side of C2 to the positive side of the battery, effectively placing it in series. This raises the voltage on the LED to a level sufficient to turn it on. We get a brief bright flash, which



is particularly bright if an ultra-bright LED has been used.

When C1 has discharged, the three transistors turn off and C1 starts to charge again, repeating the cycle. With the values shown, the flash rate is about one per second with a flash duration of about 30ms.

Keith Gooley
(via email) \$30

As an added incentive for readers to contribute interesting ideas to this column, the idea we judge most interesting each month now wins its contributor an exciting prize, in addition to the usual fee. The prize is an open order to the value of \$300 from Oatley Electronics! Yes, that's \$300 to spend on anything you want from Oatley's wide range of products, so check out their ad (or their Website) to see what's on offer.

**Win our
'IDEA OF THE
MONTH'
Prize!**

Low dropout voltage regulator

I have a friend who flies ultra-lights. He uses a transceiver that operates on the aircraft frequencies, which runs on NiCad batteries. Unfortunately, four of the 10 cells failed, and so I was asked if a power supply could be built that ran off the accumulator used for the craft's 12V lead-acid battery.

The circuit had to supply at least 11.2V at 1.5A from the 12V battery, but had to be able to handle the 20+ volts when connected to the wall charger and cradle. It also needed reverse polarity protection, as there was no guarantee that it would always be connected properly. An inline diode was therefore essential.

A simple 7812 regulator circuit resulted in a 2.1 - 2.8V drop across the regulator (depending on the brand), and no joy on transmit.

A standard two-transistor regulator circuit wouldn't allow the set to transmit, and while a slightly modified design using a MOSFET worked a little better, the transmitter still wouldn't run. Of course, adding a series diode to these circuits only made matters worse.

The 2SK2175 and its equivalent CMOS 3055 and BUZ71 wouldn't turn fully on with the low overhead voltage (I was using a new 12V Gel Cell outputting 12.6V for testing). I found that if I applied a higher gate voltage, the MOSFET would turn on fully, giving a

negligible voltage drop (less than 0.1V/A). The high voltage (22V) used to turn the device fully on is derived from a simple voltage doubler, driven by a 555 oscillator.

In operation, Q1 is turned on initially by the 820k resistor, while D5 blocks the backflow of the 22V from the voltage doubler. The 22V is applied via D3 and R3 to the gate of Q1, which turns fully on. If the supply voltage rises over 12.7V, the Zener conducts and Q2 turns Q1 off proportionately. The circuit's output voltage equals the zener voltage plus 0.7V.

It isn't real elegant, but it works well and is able to run 12V devices off 12V batteries, and will allow the batteries to be charged at

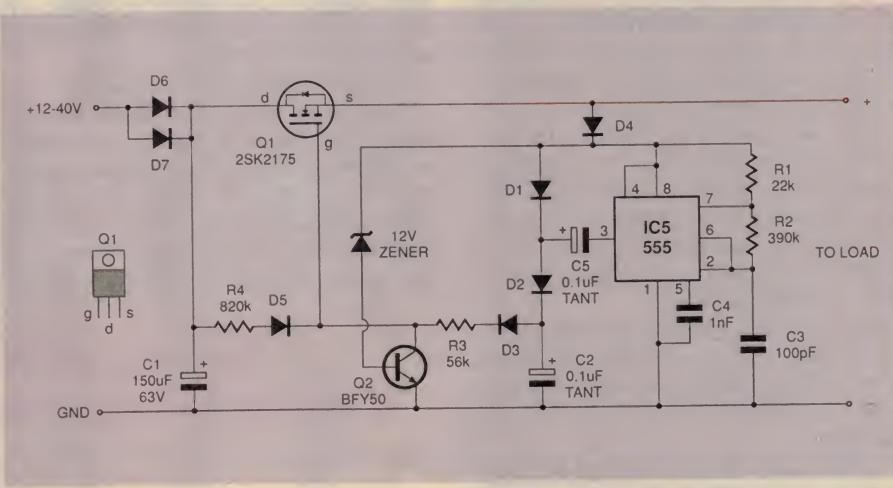
the same time if required, providing classic power regulation.

For reverse polarity protection, two diodes in parallel reduced the voltage drop across them to 0.7V at 1.5A. Single diodes had around 0.9V drop. The total voltage drop of the regulator, including the parallel diodes is 0.8V at 0.5A. Without the diodes this falls to 0.1V. Hard to believe...

The whole circuit fitted into the empty space left by the 10 AA NiCads.

Chez Watts
Brackenridge, Qld. \$40 ♦

THIS MONTH'S WINNER!



Auto-arming EA's Engine Immobiliser

This is a very simple circuit having only six components and is a handy addition to the Engine Immobiliser published in February 1984. It will automatically arm the immobilis-

er when the ignition is turned off, and will disarm it when the headlights are flashed.

The big advantage of the circuit is that any switch that goes to +12V when activated can be used (instead of the headlights), and the dash doesn't need any modification.

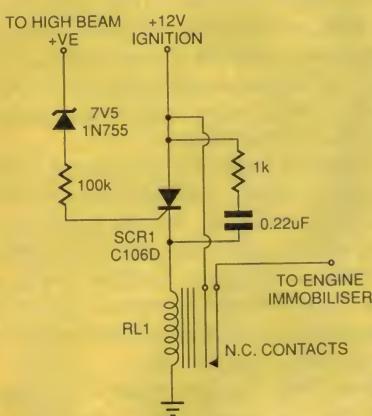
The circuit is powered by the same line as the car's ignition coil. When the ignition is turned on, SCR1 is off and the contacts on RL1 are closed, and the immobiliser will work.

When the headlights are flashed, SCR1 will conduct and stay on and the relay coil (RL1) will go open. The immobiliser is disarmed.

When the ignition is turned off, the immobiliser will be reset. If the car is stalled by the driver, however, it can be restarted without resetting.

The zener diode stops SCR1 from turning on when power is applied, as sometimes occurs with SCRs if held at 0V at turn on.

Ian Bush
Miranda, NSW \$30



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by Stewart Fist

Epidemiology: you can't ignore it

OFFICIAL SOURCES say that 43% of all official statistics are totally worthless, but the problem is in deciding which 43%. Lord Rutherford was even more critical: "If your experiment needs statistics, you ought to have done a better experiment", he is supposed to have said.

How does anyone go through life constantly suffering jibes like: "You can prove anything with statistics", and remarks like 'Lies, Damned Lies and Statistics'? This latter witticism is attributed to Disraeli by the English, to Rousseau by the French, and to Mark Twain by the Yanks.

So I have some sympathy for epidemiologists. They practice a profession which comes under attack almost as much as dogcatchers, politicians, used-car salesmen and journalists.

In most parts of the world, professional epidemiologists come out of university as mathematicians or statisticians, with only a few having any biomedical expertise. Generally they pick up their medical knowledge on the job.

Many find their way into the upper ranks through employment by state health monitoring units, insurance companies or government departments, as recorders of health statistics — mainly doing actuarial work.

This isn't a bad start for an ambitious young statistics major. The overview that such analysis provides tends to promote epidemiologists into key positions in administration, and here they may come to direct public health research projects and sit on government advisory boards.

By contrast, the laboratory biomedical research scientist working at the actual coalface of health and medical problems is often seen as too nerdish and specialised for these decision-making and advisory roles.

If their luck persisted, an ambitious epidemiologist might eventually get a highly-paid job as resident scientist-administrator

with a United Nations health organisation, or become director of a national research program funded by government or industry. At this stage, their job is almost indistinguishable from public relations.

Maybe I'm being hard on them.

There's no doubt that some of the best scientists I've met in the health and environmental research sector are epidemiologists, and also some of the worst. Polarisation appears to occur because, if they are good at their job, they are often well rewarded; if they aren't, they can earn even more as an

rienced one of its regular cholera epidemics.

Dr John Snow, a local physician, took the trouble to identify the location of his cholera victims on a street map and noticed an obvious pattern of infected residents around two water pumps. The pump-handles were removed and the epidemic stopped.

This was epidemiology's first and most dramatic success; from this point on it was all downhill.

However for most of the next century, epidemiology led the way in identifying dangerous and harmful organisms and condi-

This was epidemiology's first and most dramatic success; from this point on it was all downhill.

administrator.

But currently there is no widely recognised professional qualifications for epidemiologists. Anyone with enough chutzpah and a pocket calculator, can become one overnight — although you might have some trouble getting peer-review journals to publish your research reports.

Many lightweights

In short, this area of EMF research is a hotchpotch of highly skilled and unskilled researchers; intelligent dedicated professionals and educated-idiots; 'tobacco scientists' willing to provide any result their funders want; and many lightweight academics on both sides of the divide, enjoying a varied life on the lecture and consultancy circuits.

For this reason the general credibility of epidemiology is very low, but it has not always been so. Epidemiology was once a most respected profession, in fact it dates back to 1854 when the city of London expe-

tions in the environment. Indeed, despite constant controversy, it's been the mainstay of all of our major public health initiatives — up to, and including, the recent anti-tobacco drives.

But today, most of the more obvious, dangerous, critical (in terms of time), and simple (in terms of cause-effect) health and environmental conditions are well known. The easy stuff has been achieved; now epidemiology is being called upon to deal with the diffuse and the difficult.

First-class expertise is needed to extract statistical causal links between low-level pollutants and many low-incidence, long-term, insidious and cumulative health effects — when confidence in the basic data is not high. Such problems only reveal themselves in statistical tables as minor blips on an otherwise blurred background.

These New Age conditions under suspicion may or may-not have thresholds of exposure, and different people may have

individual susceptibilities. It is also difficult to be sure whether these problems are real or psychosomatic.

Today there are two major types of epidemiological research relevant to the study of radio frequencies: geographic (whole population) studies, and cohort (work-place or relatives) studies.

The London cholera outbreak is a good example of the first. Dr Snow identified clusters of people suffering a certain health condition, and related this higher incidence to a geographical environmental source. Dr Bruce Hocking, the ex-Chief Medical Officer of Telstra, did a more sophisticated version of this in 1996 when he looked at the incidence of childhood leukemia in homes at varying distances from the Gore Hill (Sydney) television transmitters and found a slightly raised level of leukemias among those living closer to the masts.

Cohort studies

The second type of study depends on 'cohorts', which here means family, friends or work-mates. This is where epidemiologists look statistically at small groups who experience the same or similar working or living conditions.

One of the most dramatic of these was a 1993 investigation into the rate of miscarriage of 19,100 American physiotherapists. (Mostly female! With 6600 pregnant). Diathermy, of course, uses radio frequencies to deliberately raise the local tissue temperature — but supposedly in the patient, not the physiotherapist.

Some diathermy units use microwave frequencies of 915MHz, which fall right between the go and return channels of analog cellular phones, while an older type (still widely used) runs in the shortwave band at 27.12MHz.

Higher than normal levels of miscarriage among physiotherapists is fairly well established, but the real interest was whether this rate could be related statistically to the radio frequency. Dr Hocking also did an unpublished study on this subject while at Telstra.

The American researchers found that, before the seventh week of gestation, 47.7% of those using the microwave diathermy had miscarriages, while the control groups and shortwave diathermy operators averaged rates of about 22%.

Another form of cohort study was run by Dr Samuel Milham, an epidemiologist at the Washington Department of Social and Health Services, in 1984 when he surveyed the deaths of 2485 Washington and Californian amateur ham radio operators.

Milham used the FCC records to look up their death rates between 1979 to 1984, and concluded that *amateur radio operator licensees in Washington state and California have significant excess mortality due to*

acute myeloid leukemia, multiple myeloma and perhaps certain types of malignant lymphoma. These are all cancers of the blood.

His report showed leukemia deaths in Californian hams exceeded the general rate in the population by a ratio of 31 to 24.3. These were low incidence figures overall, but the difference between hams and non-hams is highly significant when two thousand people are investigated thoroughly.

The most disturbing finding was that the incidence of Acute Myelogenous Leukemia (AML) was nearly doubled (15 cases compared to 8.5 expected) among the ham operators.

Despite the best efforts of epidemiologists to eliminate variables other than the one under suspicion, it's almost impossible for them to escape the 'confounder' problem — the chance that something else created the cluster.

Milham himself points out that ham radio operators tend to work in environments laden with solvents, volatile oils, lead and solder fumes. Nothing is quite as clear-cut as it appears on the surface. So such studies deserve to be both treated with respect, and taken with a pinch of salt...

Bruce Hocking wasn't primarily interested in television signal exposure. He began this research at Telstra using TV towers as a proxy for cellphone towers. The primary aim was to look at the incidence of blood and brain cancers, and these generally take about 10 years to become obvious to the point where they are diagnosed. Mobile phones hadn't been around that long.

He drew rings every four kilometres on the map, took measurements of power density within these expanding annuluses, and used these as a long-term exposure proxy for cellphone signals. When preliminary results began to show that there might be potential problems, Telstra closed down the research and made the Chief Medical Officer's job redundant.

To Dr Hocking's credit, he continued the work outside and found slightly raised levels of childhood leukemia (statistically significant) in those households receiving the higher EMF dose, within the four kilometre ring.

However with Hocking's TV tower study, one possible confounder is airborne lead from nearby highways which converge in this area; another possibility is that there are some toxic problems from old factory sites in the Lane Cove area.

Hocking is the first to admit that his findings don't prove a direct link between RF and leukemia — but they do raise serious doubts, and they demand that further research be done.

This isn't an isolated study: similar research has turned up similar results around transmission towers in England, Scotland, Hawaii and Portland, Oregon. ♦

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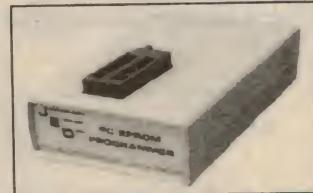


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\$10 Wonders

23 — A Peak Level Monitor

Making your own test equipment is always a good idea, as you'll not only learn a lot about the device itself, but usually you'll also save yourself a lot of money! This month's Wonder is a peak-level monitor, useful for testing amplifiers, digital circuits, or in fact anything that produces an output of +/-7V peak.

HERE'S SOMETHING for the workbench this month. The more expensive multimeters often have a peak level mode in which they register the maximum voltage reached since they were last reset. This is a very useful facility to have when testing amplifiers and similar equipment.

It can also be handy when testing logic circuits, as it can pick out a transient high pulse (or show that there hasn't been one) and can distinguish between an output that is hovering half-way between high and low, or one that is swinging strongly in both directions.

Fortunately it is easy to add this peak level facility to a cheaper multimeter, and of course, it can be done for under \$10.

How it works

The heart of the circuit is the op-amp IC2a, in Fig.1. This is wired as a unity gain voltage follower, but with a slight difference — the diode D2 on its output terminal.

In a normal voltage follower the output is fed directly back to the inverting (-) input, as seen in this circuit's second voltage follower, IC2b. With IC2a, the usual rules for op-amps apply and it stabilises when the voltages at its two inputs are equal. This is when the input voltage at pin 3 equals the voltage at the cathode of D2. There is, of course, the usual voltage drop of about 0.7V across D2, but the op-amp compensates for this by simply increasing its output voltage by 0.7V. As a result of all this, C3 is charged to a voltage equal to the input voltage.

If the input voltage rises to a higher level,

the voltage at the cathode of D2 rises equally, and C3 is charged to the higher level. But the reverse does not happen if the input falls. If the voltage across C3 is to fall, the charge must go somewhere, but there is nowhere for it to go! It can't pass through SW2 to the 0V line, because SW2 is open. It can't pass into the op-amp IC2b because this is a biFET op-amp, with an input resistance of 10^{12} ohms (that's one teraohm, or a million megohms). It can't even flow away through

diode D2, because diodes allow only one-way flow and this is the wrong way.

So C3 remains charged, even though the input voltage falls. Each time the input voltage increases above its previous maximum level, the charge across C3 increases too. And so at any instant, C3 is charged to the maximum or peak voltage reached so far.

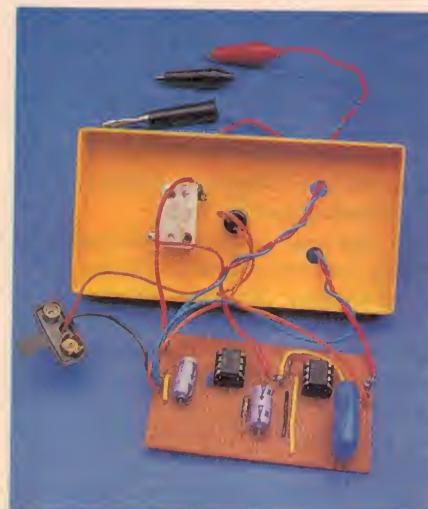
The circuit's high input resistance means that the monitor can be used to measure peak voltages from sources with high output resistance.

As well as the advantage of high input resistance, another reason for choosing the TL072 is its high slew rate of 13V/us. Such a high rate means that its output is able to swing rapidly to catch sharp voltage peaks. The input offset voltage is 3mV, which is typical of biFET op-amps, but this is not large enough to be of concern in this application.

The purpose of IC2b is to allow us to read the voltage across C3 without letting the charge escape. IC2b is wired as a unity gain voltage follower. The amplifier is stable with both its inputs equal to the voltage across C3. This means that the output is equal to the voltage across C3, which in turn is equal to the peak input voltage.

The point about IC2b is that although it has an exceedingly high input resistance, it has like all op-amps a low output resistance. This is of the order of 75Ω , so it provides plenty of current to drive the meter without any appreciable fall in the voltage reading. If you want to, you can use a cheap moving-coil meter for ME1.

Peak level circuits often have a high-value resistor wired across C3. This allows the charge to leak away slowly, so that the output voltage eventually falls to zero. According to theory, this should take five time-constants, where one time constant is equal to $R \times C$. With a $1\mu F$ capacitor and a



Here's the completed Peak Level Monitor showing the wiring to the two switches and input/output terminals. The prototype was fitted into a small plastic slide box, along with a 9V battery.

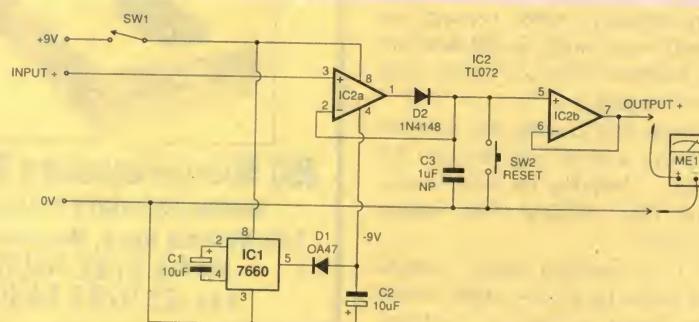


Fig.1: IC2a buffers the input signal and charges the storage capacitor C3 with the peak input voltage. IC2b buffers this voltage and drives a voltmeter, while SW2 allows you to reset the circuit by shorting out the capacitor. IC1 generates the negative rail needed by the op-amps.

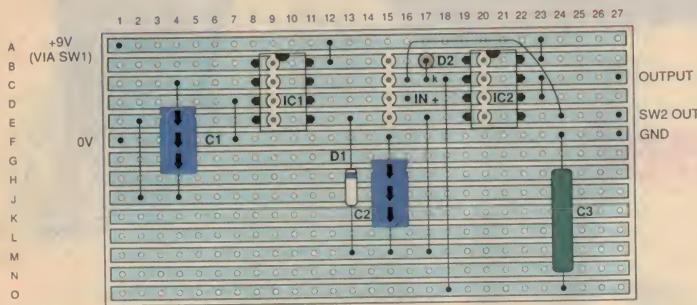


Fig.2: A big board with few components... Nothing much to note about construction, just make sure that you install the germanium diode for D1. One other point: this is one of the few circuits around that doesn't use any resistors!

1M resistor, $RC = 1$ so the charge leaks away in five seconds.

This is rather too short a time for most applications, especially if the meter is a digital one with a relatively slow refresh rate. A 10M resistor would be better, however we found that reverse leakage through D2 discharges the capacitor in a reasonable time, so we have omitted the resistor. Instead there is a pushbutton SW2 for discharging C3 instantly whenever a new peak reading is required.

The lower part of Fig.1 demands some explanation. The op-amps run on a +/-9V supply, which could come from a pair of PP3 9V batteries. Instead of a pair of batteries, we're here using one battery to provide the +9V supply and a voltage inverter circuit to provide the -9V supply. This costs less than the second battery, and avoids the problem of one battery running out before the other.

The 7760 is an IC which when wired as shown produces a negative output voltage equal to the inverse of its positive supply voltage. The amount of current it is able to supply is limited, so the negative voltage does not quite match the positive supply. In this circuit it is about -8V, which is adequate for peak input voltages up to about 7V.

Construction

The circuit is set out on a piece of 42 x 70mm stripboard, as shown in Fig.2, and this will fit into a small plastic enclosure (we used an old 35mm slide box). There was room for the circuit board and a 9V PP3-type battery.

Assemble the voltage inverter (IC1), noting the orientation of the two capacitors, particularly C2 which has its negative terminal connected to the -9V rail. The diode is a germanium signal diode. An OA47 is specified, but any similar germanium diode will do. Check the output voltage at the anode of the diode. With no load it should be very close to -9V.

Next assemble the peak level circuit. A polyester or other low-leakage capacitor is essential for C3. Electrolytic and tantalum capacitors have too high leakages to be suitable.

The types of input and output connectors are optional. We used crocodile clips as

input connectors, as these can be clipped to appropriate points in the test circuits. The output leads are terminated in 4mm banana plugs so that they can be plugged into the terminals of a multimeter, in place of the usual test probes. Other terminals that you could install include 4mm sockets, terminal posts, and test clips.

To test the circuit, connect a 10k or 100k potentiometer across the 9V supply. Connect the wiper of the potentiometer to the input of the circuit. By turning the knob of the potentiometer we can deliver to the input a varying voltage ranging from 0V to +9V.

Start with the wiper at the 0V end of the track so that the circuit receives 0V. Connect a meter to the output and set it to the 10V or 20V scale. If you have a second meter, you can connect this to the input to monitor the input voltage. Press SW2 to reset the circuit, and turn the potentiometer to increase input voltage to, say 2V. The output should read 2V.

Now decrease the input to 1V. The output should still read 2V, though it can be seen to be falling slowly. Press SW2 to reset the input. The output falls to 0V, but instantly rises to 1V when the button is released. Repeat for a few other voltage levels in the range 1V to 7V, to confirm that everything is working correctly, and the latest addition to your test bench is finished! ♦

Parts List

Capacitors

C1, C2	10μF axial electrolytic
C3	1μF polyester

Semiconductors

D1	OA47 (or equiv.) germanium signal diode
D2	1N4148 silicon signal diode
IC1	7660 voltage inverter
IC2	TL072, dual low-noise biFET op-amp

Miscellaneous

SW1	SPST toggle switch
SW2	N/O pushbutton
Stripboard	42 x 70mm (14 strips x 27 holes), 5 x 1mm terminal pins, 2 x 8-pin IC sockets, input and output terminals, 9V battery clip.



The following Tax forms are now available at your Newsagency.

Employment Declarations,
Weekly and Fortnightly Tax Instalment Deduction Schedules,
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After February these tax forms will no longer be available from Australia Post. Pick them up from the specially designed display racks at your local newsagency where you see this sign



Exploder Begone!



IN APRIL LAST year, in the midst of Microsoft's claims that it couldn't be done, this column revealed a method of removing an unwanted Microsoft Internet Explorer from a reluctant Windows 95 installation. Not long after that, Microsoft placed a 'proper' Explorer remover in the Windows Add/Remove Programs area of Control Panel.

At that stage it appeared *that* was the end of the 'compulsory Explorer' saga; but then along came Windows 98, with Internet Explorer firmly welded into the system. It did appear to be truly un-removable...

In my Sony laptop computer, Win98 caused no end of problems, along with sluggish performance. Since I couldn't kick out Explorer, I kicked out the entire Windows 98 installation and reverted the machine back to Windows 95, much to the disgust of Sony tech support. And — my laptop has worked fine ever since!

Abandoning Windows 98 altogether is a radical measure, just because you feel that the bulk of Internet Explorer is compromising the performance of your computer. But now it looks like a guy at the University of Maryland has come up with a solution. After much experimentation, Australian-born researcher Shane Brooks has discovered that the simple removal of three files and replacement with their Windows 95 equivalents will remove Internet Exploder, Active Desktop, and all those other 'features' that so many Windows 98 users would prefer to do without.

Windows 98 does have some real advantages over Win95, particularly in hardware compatibility issues and its file handling methods. With Shane's fix, Windows keeps those Win98 improvements while retaining the speed and agility of Win95. This is a fine piece of work, and all Windows hackers worldwide should bow down and pay homage in Shane's general direction.

Microsoft, naturally, is not impressed. They immediately stated that anyone who turns their computer into Win95/8 blows their tech support for ever more. But this isn't such a big deal; when I back-graded my laptop to Windows 95, Sony's free tech support was suddenly no longer free. So I

fixed my own problems, and learned something in the process — probably a better outcome overall.

A Microsoft spokesman said it wants more time to evaluate what Brooks has done, but said it doesn't think the modification is good for end users. "We allow end users to change Windows 98 in any way they wish, but the initial impression is this process seems to retard and replace many of the core functions that users benefit from in Windows 98".

Retard? People who've done the hack say it provides a dramatic speed improvement, better stability, and it saves over 32 megabytes of disk space to boot.

As for me, I haven't modified my own computer. It's sticking with Windows 95 for now, on the grounds of "if it ain't broke, don't fix it". But somewhere down the line, as Windows 98 evolves, I might just take the plunge.

In the meantime, Shane Brooks has released a series of small programs you can use to modify an existing Windows 98 installation, or conduct a clean install from scratch minus Internet Explorer. He calls it 98LITE. It's not very large, so I've zipped all the files together for downloading from the *Electronics Australia* web site. Look for '98LITE.ZIP'. But BEWARE! This process is still somewhat experimental, so you should BACK UP your whole computer before attempting any modification of this scale.

Perhaps now is a good time to look at why replacing three files with earlier versions saves 32MB of disk space. The files in question are ComDLG32.DLL, Shell32.DLL, and Explorer.EXE. I don't have access to Win98 at the moment, so I'm not sure how big these are in their Win98 versions. But the Win95 equivalents total around 1.1MB.

The WINDOWS\SYSTEM directory is full of DLL's, some of them well over a megabyte on their own. DLL stands for 'dynamically linked library'. Older computer programmers will remember subroutines, chunks of code which are used over and over by other routines in the program. The main program reaches out to wherever the subroutine is stored, uses it, and then lets it go

again. Subroutines are commonly referred to as 'procedures' in more recent computer languages such as C.

The 'library' in a dynamically linked library is a collection of subroutines which perform various functions not necessarily related to each other. 'Linked' is the process of making the subroutine available to the main program that needs it. In the case of 'easy' versions of languages such as C, collections of useful subroutines are stored in 'object files' which are made available when a C program is compiled into an executable file. The compiler sucks in the subroutine from the object file and stores it permanently within the main program. Once that's done for all subroutines, the object files aren't needed any more.

An object file often contains many different routines, although the C program being linked to the object file may only use one or two. No matter; once program compilation is finished, the object files can be put away for future use by other programs which might care to use their subroutines once again. A C-programmer soon builds up a good collection of object files, many home-brewed by the programmer when no ready-made library is available to do the job required.

'Dynamic Linking' in DLLs means the main program reaches into the DLL file and runs the subroutine right where it sits, rather than copying the routine into itself during program compilation. This means the DLL must always be present when the main program is in use, even though the DLL may contain a hundred subroutines and the program only needs one or two. But it also means several different programs can use the one DLL.

This is the kind of programming used in Windows, and I suspect it is the main factor responsible for 'software bloat'. There are DLLs everywhere, with subroutines covering every option under the sun, even though an individual program may use only one or two.

I can't tell you how many DLLs come with Internet Explorer, since that program isn't installed on my computer. But Windows 95 itself, just in its SYSTEM directory, has more than 39MB worth of

DLLs. Netscape Communicator has 18 DLLs, and even the little Opera WWW browser has five. And one would suspect that many of these DLLs contain subroutines that are never used by anything — they're just taking up space.

Now Netscape has decided to bite the software-bloat bullet. They're working on a new browser project called Gecko. Netscape says up until now, every new browser has been based on code from an earlier one, so some code from Navigator Versions 1, 2, and 3 is still floating around in Navigator 4. With Gecko they're going back to square one — writing new, tight, fresh code, and heaving out all those monster DLLs from the past.

A demo version of this new Gecko browser has been handed around to computer journalists, on ONE floppy disk. Currently only Opera fits on one floppy, although the earliest Netscape as I remember came in around 700k, and grew from there. If this Gecko thing becomes a commercial reality, I'll be among the first to grab it. All the current Netscape functionality, on a single floppy.

Retard? People who've done the hack say it provides a dramatic speed improvement, better stability, and it saves over 32 megabytes of disk space to boot.

Wow — that's for me!

After hearing rumblings about the Gecko project, I decided to see how much I could find out, straight from the horse's mouth. So I logged onto Netscape's web site, www.netscape.com. I was using the Opera browser at the time, and it came back with an image of a bank advertisement reproduced three times across the screen. I decided either Netscape didn't want to cooperate with an Opera browser (I wouldn't blame them...) or Netscape was throwing Java at me. I have purposely left Java capability out of Opera to keep it mean and lean.

So I fired up Netscape Navigator on my system, and again typed in

'www.netscape.com'. What I got back wasn't a bank this time, but window after window of PORN of the hardest-core variety. There were pictures of women in somewhat unusual poses, with messages saying 'click here for more'. Then another window would pop up with some other tantalizing offer. This didn't look much like the Netscape home page of old...

It appeared that somebody had hijacked Netscape's web address. I know it's not a politically correct thing to say, but I rather admired their bravado. What a great hack! It had a style and skill pretty much lost to today's generation of hackers, and I decided to try to see if I could figure out what they'd done.

So I used a program called NetLab to ask the main Internic domain name server what internet address had been assigned to www.netscape.com. It came back with a numeric address as expected. Then I did a reverse search on the numeric address to see what domain name it revealed, and this is what I got: me2.netscape.com. Me2 as in

There was a mention of Gecko there, but it was all pretty vague. So I put in a phone call to Netscape PR's people, mostly to ask their reaction to having their web page hijacked. No one could talk to me, so I left a message. And they never called back, even after a couple more messages. Maybe they knew I was going to ask them how it felt to be in the porn business — but I was going to ask about Gecko too, I really was!

From the trenches

You may have heard about the fellow from Queensland, I believe, who bought a nice new Toshiba laptop computer, complete with Windows. Trouble is, he didn't want Windows. Upon starting Windows for the first time he noticed the end-user agreement which said, among other things, that if you refused to abide by the agreement you could return Windows for a full refund.

This fellow took the message literally and told Toshiba he wanted to return his Windows software for a full refund. Dealer and user went round and round, but eventually the guy got his money and had a Windows-free computer.

This morning I got an e-mail from Jim Lawler, another associate of *Electronics Australia*. He included an article from the Weekend Australian detailing the Toshiba case, along with information about a movement that has formed to make it possible to buy Windows-free computers. The article said people all over the world were going to march on Microsoft offices demanding refunds for unwanted Windows.

This is supposed to happen on February 15, two days from when I'm writing this. I can just imagine a pack of irate computer users waving Windows CD-ROMS, storming Microsoft's corporate headquarters in Seattle. Monday is a public holiday though, so their timing may be a little off.

As it happens I'm working in our community TV station that day and can't get to Seattle. But I've e-mailed the news department in one of the big commercial TV stations in Seattle, suggesting their technology editor might like to keep an eye on Microsoft. If it happens it will make a great television story. Stay tuned! ♦

'me-too'. And typing the me2 version of the address into Netscape brought up their home page as normal.

So it looked like the hackers had somehow shunted Netscape's real internet address over to www-me2.netscape.com, and assigned their own porn address to www.netscape.com. I guess I should resist the temptation to say that was one very clever piece of work.

All this happened pretty late at night, so I decided to put it aside and go to bed, and continue examining the hack the next day. But when I tried www.netscape.com the following morning, everything was back to normal and I got the Netscape home page.

OVERNIGHT DELIVERY



CCD Surveillance Cameras

All models feature composite video output suitable for direct connection to the video input on a VCR, Monitor or an AV transmitter. The addition of an RF modulator can also allow the camera to connect to the antenna input of a TV or VCR.

Ideal for use in Shops surveillance systems, door monitors, monitoring machinery and other security or safety applications.

Ceiling mounted compact dome camera is ideal for shop surveillance systems. Its visible appearance makes it an excellent deterrent to would be thieves.

Requires regulated supply. (M 9516)

S 9110 \$149



Miniature Cameras. 3 models available. 2 surveillance only (S 9000/50). The other model includes a microphone for audio (S 9005). Supplied with in-line BNC connectors for video and a DC Jack for powering the unit, the S 9005 also has an RCA connector for audio output.

Requires regulated supply. (M 9716)

Ideal for use in shop surveillance systems, door monitors, video intercoms, reversing monitor for large vehicles, and security or safety applications.

S 9000 B&W RRP \$139

S 9005 B&W + Audio RRP \$169

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PCB & Lens Cameras. Using only a 3 wire connection, these mini cameras can be installed so they are virtually undetectable. 3 models to choose from.

Requires regulated supply. (M 9516)

S 9010 B&W RRP \$125

S 9030 B&W with Infra Red Illumination RRP \$135

S 9020 B&W Pin Hole RRP \$125

Add-On Audio Module



This module enables you to receive audio as well as video from your surveillance camera. Designed to fit directly onto our PCB module CCD camera S 9010, the unit is supplied with all leads for easy installation.

S 9100 \$19.95



Ideal for use in Shops surveillance systems, door monitors, video intercoms, monitoring machinery and other security or safety applications.



Regulated Power Supply for CCD Cameras

This plugpack has a regulated output, and is suitable for powering the CCD cameras above. 6, 9, 12VDC @ 500mA.

M 9516 \$28.95

4 Way Audio Visual Camera Switcher

Monitor up to 4 A/V channels with this advanced automatic A/V switcher. Any combination of the four cameras can be scanned and displayed on either of the two monitors, it switches both video and audio. The time and date is displayed on both monitors making it ideal for surveillance applications. The scan rate and duration of each camera can be configured using the on screen menu functions.

S 9200 \$225



Integrated PIR & CCD Camera with Audio

Can be configured to trigger a VCR to record an intruder's movements!

Similar in operation to the cameras above, this combination camera / PIR is an ideal low cost total surveillance solution for the small office, business or home. It's very easy to install and connect with all mounting hardware including a unique swivel mounting bracket and connectors supplied. Features N.O. & N.C. switched contacts for triggering an alarm or remotely controlling a VCR/TV for unattended recording. Dimensions: 115L x 60W x 30.8D

S 9040 \$249



300W Mini Inverter

This amazing inverter provides up to 300W of 240V AC power from your car cigarette lighter socket! During our evaluations, it ran our entire A/V room setup, including a huge 68cm television and A/V amp! Can power televisions, VCR's, lights, Phone and Camcorder battery chargers, shavers and hi-fi systems. Features low battery indicator and overload shutdown. Built-in 3-pin plug (no adaptor required).

Includes car cigarette lighter socket lead.

M 8115 \$229

SAVE \$\$\$

Bonus Offer!
This month, every M 8115 comes with a P 0150 Lighter Socket Double Adaptor, worth \$12.95, FREE!

BONUS OFFER!

The first 50 callers to purchase a T 1280 receive a T 1274 Bench Stand, valued at \$24.95, FREE! The T 1274 keeps your desoldering tool safely upright on your workbench and shields the hot element!

Powerful, compact & robust!

Now over 1500 units in service Australia wide!

Illuminated Magnifying Lamp

"Fantastic for servicing PCB's and identifying micro miniature components"



The magnifying head is easily set to the desired position on it's spring-loaded arm assembly. Simply clamps to your workbench or desk.

As you grow older, it's inevitable that your eyesight is going to falter. Maybe you're already finding it difficult to read those tiny zeners or find that small solder bridge on your PCB. If so, this magnificent 3 dioptre illuminated magnifier could be the solution for you. Uses are not only limited to electronics, of course. It's ideally suited to stamp and coin collectors, model makers, embroiderer, jewellers and the like.

A 0970A \$129

No workbench should be without one!



The Holy Grail of screwdriver bit sets!
BONUS! Buy Both sets for \$26

33Pcs Driver Bit Sets

All housed in a handy plastic holder. Great for the toolbox, workbench, etc. Suitable for use with battery drills or most hex bit drivers.

T 2182 Driver Set contains: • 5 Slotted • 8 Phillips • 7 Pozi

• 6 Hex • 6 Star • 1 Magnetic Bit holder.

T 2180 Security Bit Set contains: • 4 Triwing • 9 Torx • 4 Snake Eye • 12 Hex (6 Metric & 6 Imperial) • 3 Torque • 1 Magnetic hex extension bar

T 2182 \$13.95 **T 2180 \$13.95**

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19 Range Pocketsize DMM

Great for the trades person on the move, or for a student lab kit. Includes an audio continuity buzzer, K' type thermocouple, and square wave test signal output. Measures DC Volts to 1000V, DC Amps to 10A, AC Volts to 750V, resistance to 2MΩ and temperature from -20°C to 1370°C. It even includes a diode test function! Measuring only 70 x 126 x 25 mm and weighing only 170g, this meter is a pocket rocket with a price to match!

Q 1051 Was \$29.95, NOW JUST \$20

Q 1054 Carry Case ONLY \$5

Includes Temperature Probe & Thermocouple for Measurements up to 1400°C!

24 Pcs Combination Tool Kit

Includes: • Side cutters • Long nose pliers • 6 Jeweller screwdrivers • Tweezers • Handle plus extension bar • 4 Sockets, 7, 8, 9 & 10mm • 9 bits, 2 Phillips, 2 Slotted and 5 star

All housed in a plastic fold up case. Great for the toolbox, workbench, etc.

T 2170 \$23.95 Excellent value at less than \$1 a tool!



Micron Desoldering Tool

Desolders a 14 pin IC in around 30 seconds!

The T 1280 makes it a breeze to remove components from any PCB, even double sided.

through-hole plated boards. All it needs is a squeeze or two on the trigger and the component virtually falls out. Features: • Totally self contained • Light and compact • Anti static tip • Safe & easy to use • Simple to clean and maintain • Variable tip temperature. The Sure Shot generates a high speed vacuum every time the trigger is squeezed. This vacuum sucks the molten solder into the collection reservoir of the unit. Here the molten solder solidifies into small particles.

T 1280

Was \$349 NOW

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Replacement Tips

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Coaxial speakers placed in car doors often suffer from "treble muffling", as the tweeters simply fire straight into the passenger's legs, or straight across the car at ankle height, which isn't much good for imaging or sound quality. This 165mm split system enables you to mount the 6.5" mid bass driver in the door, and the dome tweeter on the dash or on top of the door trim for optimal staging, ie "on axis".

The C 9302 split system comes complete with two-way crossovers, mounting hardware, grilles and speaker wire. Impedance: 4 ohm, Power Rating: 100W RMS, Freq. Response: 55Hz - 20kHz



C 9302
\$179.95

Car Audio Subwoofers

These high power subwoofers are essential equipment for big car audio systems. Producing deep vibrations and thunderous rumble, they'll keep even the biggest bass fans smiling. They feature long throw surrounds and highly rigid cones to minimise distortion at the limit. Equally at home in sealed or vented enclosures, they can be used in single- or multi-speaker sub cabinets.

And not only do they sound incredible, they're mirror finish cones give them plenty of visual impact, as well!

See our 1999 Catalogue page 168 for full specifications.
C 3048 200mm (8"), 4Ω, 160W Subwoofer

\$119

C 3050 250mm (10"), 4Ω, 200W Subwoofer

\$149

C 3052 300mm (12"), 4Ω, 250W Subwoofer

\$169

TURBOCHARGE YOUR SOUND MACHINE!
These HIGH POWER, HIGH PERFORMANCE drivers are a must for the serious sound enthusiasts!



5 Port 10 Base-T Ethernet Hub

Ethernet Hubs are widely used in the commercial market and are now becoming more popular in the domestic sector with the advent of many new programs that demand a fast and reliable link, ie.

Games, Internet, etc. The 5 port HUB will allow the user to interconnect up to 5 computers or more by using the uplink jack to connect additional HUBs. The HUB offers greater integrity than that of a 10 Base-2 network by using a star topology, ie. If one computer connection is faulty the complete network does not grind to a halt.

Features include individual port Link/Activity, Power, Collision LED indicators. Compact size for desk mounting, includes power adaptor and Uplink switch. Modular design allows for expansion.

5 Port USB Hub

This tiny 5 port desk mount HUB is suitable for connecting all your peripherals. For instance modems, printers, keyboards, mice, CD ROMs, Scanners, etc. The HUB requires no external power and has 1 "upstream" output to connect to your computer and 5 "downstream" inputs for device connections. Dimensions: 125L x 85H x 30H



D 4300
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Laser Perimeter Alarm Kit

(Exclusive to Altronics)

A simple hobbyists device to allow you to provide laser beam security to a room or a building perimeter. The perimeter alarm will sound a piezo buzzer or trip a relay when the beam is cut from the IR detector. **Features** • Simple to construct • Operates off + - 9V supply, nicad or 18VAC plug-pack • Supplied with a low profile case



Announce
Guests or add an ear piercing siren to create a simple intruder alarm!

K 1935 **\$34.95**

A 0202 Laser Pointer to Suit **\$45**

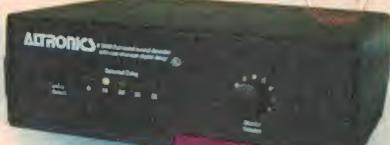
Surround Sound Decoder

Add some dimension to your favourite music, videos, laserdiscs or PC games with this fantastic new Surround Sound Decoder Kit!

(May 1999 EA)

Based around a similar design from EA in May '95, this all new design features a digital delay circuit. Easy to construct and install.

Features • Housed in a robust ABS Instrument Case • Screen printed front and rear panels • Selectable delay time from 0 - 33 milli-seconds • Indicator for selected delay time • 6 RCA outputs; L channel, R channel, center, rear, sub + and sub - (for bridging) and Delay Out (rear with delay) 3 inputs; Left, Right and Delay input



This project will add incredible realism to any sound track at only a fraction of the cost of most units available on the market!

Mobile Hard Drive Bays

Need to transfer large amounts of data between two locations or have a multi-purpose slot in your case?

This mobile rack kit is supplied in two parts.

Part one is the cradle which mounts into a standard 5.25" slot in your computer and connections are simply transposed from the drive to the cradle. The second part is the removable tray that can be slotted into any computer fitted with the cradle above. Your original device simply screws into the removable tray and slots into the cradle for normal operation. Features Power & HDD activity LED display, fan cooling. It can be utilised for hard disk drives, ZIPs, LS-120, DATs etc.



D 5500 IDE Type **\$39.95**

D 5510 SCSI Type **\$45**

Deluxe Multimedia Stereo Headset

This lightweight multimedia headset is fitted with adjustable padded headband and leatherette earpads making them comfortable for periods of long use. It's also supplied with an in-line volume control. Ideal for use for voice recognition, internet phone, multimedia applications, interactive games. It comes complete with a 1.8M lead fitted with 3.5mm stereo jack plug for microphone and speakers. Suitable for all sound cards.

Headphone

Freq. Resp.: ...20Hz - 10kHz

Impedance:32Ω

Sensitivity:92dB

Microphone

Freq. Resp.: ..100Hz - 10kHz

Impedance:2kΩ

Sensitivity:-68dB±3dB



C 9022 Normally \$39.95, NOW **\$35**

Multimedia Microphone

This ultra sensitive "plug and play" microphone is ideal for use for voice recognition, internet phone, multimedia applications, interactive games. It comes complete with a 3.5mm jack plug and is suitable for all sound cards. Can be desk mounted or direct mounted to your monitor.

Freq. Resp.:50Hz-13kHz

Impedance:1.4kΩ±30%

Sensitivity:58dB±3dB

Microphone

Freq. Resp.: ..100Hz - 10kHz

Impedance:2kΩ

Sensitivity:-68dB±3dB

Microphone

Freq. Resp.: ..100Hz - 10kHz

Impedance:2kΩ

Sensitivity:-68dB±3dB

Microphone

Freq. Resp.: ..100Hz - 10kHz

Impedance:2kΩ

Sensitivity:-68dB±3dB

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Sensitivity:-68dB±3dB

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Information Centre

by Peter Phillips

Digital TV, car lighting problems & laminating front panels

This month's line-up includes 'tingles' from an electric blanket, car lighting problems (still they come) and a way of preventing headlight filament failure in a cold climate. There's also the usual range of reader questions and ideas, and a response to a query about the November What?? question — which was about current in a TV picture tube.

By now you've probably noticed this column is being sponsored, with a prize awarded each month to the author of the 'most interesting' letter. The prize winner is selected by EA staff (not me), and the prize itself is usually shown at the end of the column. For this reason, when you write, it's essential you include your mailing address so we can contact you if you are the winner. This is especially important if you are sending an email or fax.

So what constitutes an 'interesting letter'? This is hard to define, but obviously it should be about a technical issue that's likely to interest other readers. It might be a letter in reply to a reader's question, a response to a topic we've raised in the column, or simply a question or topic that's likely to generate interest.

So far we've been able to contact all prize winners except one. I'm referring to Mr Ian Dalby, who initiated the discussion on battery capacity a few months ago. So if you are reading this Mr Dalby, please contact the magazine, as your prize awaits.

Now to some reader letters, some of which have been waiting for a while. The first takes up from our previous discussion on car lighting problems.

Headlamps & winter

With regard to headlamp filament failure under frigid conditions, I remember an article on this subject some years ago, perhaps in EA. A way of preventing filament failure due to a high surge current at switch-on is shown in Fig.1. The value of R1 is selected so the transistor is just comfortably saturated with the normal operating current of the headlamps.

When the filament is cold, the lamp will want to draw considerably more current, which is limited by the transistor going into constant current mode. This will allow the filament to heat up more slowly, minimising the risk of failure at switch on. When the filament reaches normal operating tempera-

ture, the transistor is saturated and therefore dissipates only a few watts of power. The voltage drop across the transistor will be less than a volt, which has a negligible effect on lamp brightness. Because the transistor is dissipating high power only during the filament warmup time, a large heat sink is not needed. (Keith Walters, Schofields, NSW).

Thanks for this idea, Keith. A minor problem I see is the need to customise the value of R1 for each MJ2955, due to variations in the current gain (beta) between devices. Another point to watch is the battery voltage, which can vary between 12V to 14.8V or so, depending on its state of charge. You'd need to pick a value for R1 so the transistor remains 'comfortably' saturated (doesn't get too hot) at say 13V, which is the likely battery voltage after starting the car and then switching on the headlights. As the battery voltage rises, the transistor will saturate even

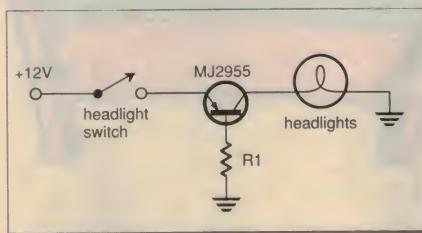


Fig.1: A method to make headlamps turn on slowly enough to prevent filament fracture at switch on.

more, reducing its heat dissipation. However, R1 must still allow the transistor to go into constant current mode, where the (headlight) current = (beta of the MJ2955) x (current in R1).

In case you want to try this idea, here's some background. The current in R1 = (battery voltage - 0.7)/R1. The beta of a typical(!) TIP2955 is 20 at a collector current of 4A, so as an approximation, R1 = (12.3)/(headlamp cur-

rent/20). So if the headlamp current is 5A, R1 = 49.2Ω, with a power dissipation (PR) of 3W. The nearest preferred value is a 47Ω 5W wire-wound resistor, which could be mounted with a metal clamp holding it to the body of the car. However, you'd need to bench (or vehicle) test the circuit to ensure it meets the above requirements, and tailor the value of R1 to suit.

A TIP2955 is perhaps the easiest type to mount, as it could be directly attached to, but insulated from the body of the vehicle. Make sure all connections to the transistor are well insulated, and use automotive rated cable (for ruggedness).

Headlamp relays

Staying 'automotive', here's another letter on car light problems:

Some Japanese cars (Toyota, Nissan/Datsun) use a wiring system where the headlights are connected with a relay feeding the lamp's common terminal. High beam is selected by grounding the appropriate lamp terminals through the dip switch.

However, when fitting a dual headlight, a special relay is needed: one with an extra terminal to supply the relay coil, as the other end of the coil is grounded through the dip switch. As well, the high beam warning light has to be connected across the high beam of the headlights, as otherwise its current will hold the relay on. This is a trap for home repairers, and requires you to locate the appropriate wire, and reconnect it. I had this experience on a Nissan 260Z, which is all part of my 20 years as an auto electrician. (P. Hutching, Palmerston North)

It's good to hear from someone in the 'trade', and I'm sure you'd have lots of car lighting stories Mr Hutching. I guess when you refer to a 'special' relay, you mean one that has two terminals for the relay coil, rather than a version which has one side of the relay coil connected internally to case/ground.

I can relate to the wiring of a Toyota

Corolla (1978), which has the wiring described above. When its headlamps would not come on, I found the headlamp stick switch to be faulty. The cure (as I recall) was to clean the contacts. But while tracing out the circuit, I found the relay, and was surprised to see it switching the headlamp earth wire.

Incidentally, although I hate to be picky, Mr Hutching didn't include his postcode. There's a Palmerston in the NT and the ACT, but no Palmerston North (at least in Australia; I believe there's one in NZ). If your letter does get picked as the winner Mr Hutching, you might need to read about it in the magazine, as we can't contact you.

'Buzzy' mattress

In November '98 a reader described a situation he faced with a water bed, in that he was getting a small but disconcerting electric shock from it after fitting a mattress with a metallic-looking outer surface. I suggested it was caused by capacitive coupling, which could be solved by connecting a mains-rated bypass capacitor between the mattress and ground. The following letter is from a reader who has had a similar 'shocking' experience, but with an electric mattress.

Many years ago when I was in bed with my wife, I discovered that if I touched her leg with a finger, she would get a small electrical 'tingle'. Wondering if this was 'true love', I then realised the electric mattress was on. Being of a scientific mind, I tried turning it on and off, without my wife knowing, and proved the shock she was getting was caused by the mattress. As there was absolutely no electrical contact between my wife and the mattress, I put it down to capacitive coupling. We have since got rid of the mattress, thereby solving the problem. (Maurice Hayward, Dunedin NZ)

Interesting story, Maurice. I've not heard of an electric mattress, so I assume it's simply a mattress with an electric heating element built in. I guess the heater must have had enough surface area to give the capacitive coupling you describe. And, going on the next letter, this sort of thing also occurs with an electric bed blanket.

Buzzy blanket

Your item about water beds that buzz brings back memories to aging ex-GPs like me, who have practiced in colder climates in the days when the domiciliary visit was a routine 30 per day chore.

I probably acquired the reputation of having a remarkable intuitive diagnostic ability, because I would often say to a patient "would you mind turning off the electric

blanket?". It's common practice for people to lay in bed with the electric blanket switched on, in order to keep warm. I always knew if this was the case, because as my fingers lightly touched the patient's skin I could feel the familiar 50Hz vibration; seemingly they could not feel it.

As described by your correspondent, firmer pressure resulted in loss of the sensation. I wrote it off in a vague sort of way as having something to do with a capacitive effect between the coiled heating element and a relatively 'earthed' me. I have always been and still am a very partially informed electronics enthusiast! (Dr J. Michael

are products you can use at home that don't need a laminating machine:

I thought you might like to know about a product called Quick Laminate, made by Marbig. It's available from most office supply companies, such as Viking Office Products. The laminate is self-adhesive and is applied to one side of the paper, or both sides if you want greater protection. Each sheet measures 305 x 230mm, and there's five sheets in a pack. Cost is around \$4 per pack. Best of all, you don't need a machine to apply it. (Peter van Schaik, Deepwater NSW)

Thanks Peter, this seems a useful product for home constructors. Incidentally, the panel I described over a year ago is still looking as good as new, so I can assure you this method works. Peter also has a question about soldering to gold:

Solder and gold

I recently had a gold ring reduced in size by a jeweller, who simply cut out a section and soldered the join. However the join soon broke, so I took it back to the jeweller who explained this happens because of the migration of metals at the junction of the bond. If so, why is gold used on connectors and printed circuit boards where leads are soldered to?

I don't know about the chemical or physical reactions between lead-tin solder and gold, but I wonder if your jeweller is any more informed. After all, if he knew this to be a problem, why did he solder the ring in the first place?

(Instead of using the correct 'gold solder' — actually a gold-silver alloy, used for brazing or 'hard soldering'.)

Mind you, I've soldered leads to many gold plated connector pins and surfaces, and so far they have all remained intact. Perhaps a few readers can enlighten us.

Oddball transistor

This letter seeks information about a rather obscure transistor:

I am after an MPSA18 transistor. I have checked various catalogues, but it's not listed. Do you know where I could get one, or an equivalent transistor? (Kayne, by email)

This device is a silicon NPN transistor made by Motorola, and can be replaced by a BC184, a BC384, a BC414 or a BC550. All of these devices come in a TO-92 package, with the base as the centre lead. I suggest you try either Farnell or RS components.

Digital TV

Digital TV is likely to interest most readers of EA, whether you're keen to own one or simply want to know more about the tech-



Hayman, Ocean Shores, NSW

So, as you point out Michael, electric blankets have their problems too. It's interesting to note that Michael felt the effect, but no one else did. Obviously you are more sensitive to electricity than most other people, which is a topic in itself!

Laminating panels

In the March '98 issue I described a way of making a front panel by printing the design onto paper, then getting it laminated. Unless you own a laminator, this means a trip to a shop that does laminating. But it seems there

nology. The following two letters explore this topic, starting with one from a reader who wonders if it's all worth the expense:

I have read that the analog TV system will be closed down in 2008, but has anyone calculated the cost of this? For example, if the transmission frequency is in the UHF band, how many people will need to upgrade their cabling system? As well, a new antenna will be needed by many people, along with a set-top box for each analog TV in the house.

And what of signal propagation? I have done numerous installations in the northern beaches of Sydney, where thanks to the North Head and Bondi UHF translators, people are getting a decent picture for the first time since TV started in Australia. So will we end up with digital 'black spots'? Think of country folk. In the Snowy Mountains, viewers get Prime and the ABC from Wagga, some 150km away. With the proper antenna, the reception is not too bad, but UHF reception comes from Bathurst/Orange, giving a very poor picture.

Furthermore, what are the ramifications for the retail sales industry? Many TV sets last 20 years or so, so what will happen to TV sales in the lead up to digital TV? I usually advise people to keep their set and get it repaired as needed, rather than buy a new one, as in a few years it could be redundant anyway. If other technicians are giving the same advice, surely this is impacting on sales.

In summary, how many people really want digital HDTV? After all, the standard of programming hardly warrants the expense people will need to go to. Is this technology for technology's sake? (Brad Sheargold, Collaroy NSW)

THIS MONTH'S WINNER!

These are very real concerns Brad, which I'm sure are being echoed by others in the industry. I suppose the closest example we have at the moment is the increasing competition between analog VCRs and DVDs. While a DVD player is \$1000 or more, it seems quite a few people are prepared to pay this to get a better quality picture and sound. For many people, the improvement in sound quality alone is worth the expense. But for the average viewer, surround sound and HDTV is not likely to be a major priority.

On the other hand, there's always a downside to change, and I guess we can't hold back because the average viewer is not interested or can't see the benefits. I held on to my analog

mobile phone for as long I could, believing the digital network to be inferior. But after changing to digital, I'm enjoying the many side benefits the technology allows, and occasionally wonder why I didn't 'go digital' years ago.

The next letter is from a reader who gives some technical details of the proposed digital TV system, and a website address where you can get further information.

Digital TV specs

There has been considerable work carried out over the past two years which has led to a number of recommendations about digital television in Australia from a TV Industry/Government technical system selection panel. Digital TV will encompass the delivery of high definition (HD) television terrestrially to Australian homes. Set-top boxes (STBs) and digital receivers will use an MPEG2 MP@HL decoder which allows both standard definition (SD) and high definition pictures to be decoded. (The UK and most of Europe are only planning SD TV using MPEG2 MP@ML.)

After extensive Australian laboratory and field testing of both the ATSC and DVB-T modulation systems; the DVB-T system has been recommended for use in Australia. The service information (SI) system that will be used in Australia will be based on DVB-SI. The preferred source image format for video will be 1920/1080/50Hz (pixels/lines/rate) interlaced with a total line count of 1125 lines. This corresponds to the international common image format (CIF).

The audio format will be Dolby AC-3 (5.1 channel surround sound) and/or MPEG1 layer II audio (stereo). Both will be defined as part of the Australian system. Programming requirements will dictate which is in use at any particular time. The receiver will need to cater for both audio systems. Currently, Standards Australia is co-ordinating the preparation of a draft standard for digital television in Australia under sub-committee CT/2 (formally RC5). The first draft document is expected in early 1999. Further technical information can be obtained from the Communications Laboratory website <http://www.comm-lab.gov.au/lab> (Neil Pickford, email)

Thanks for this information Neil, and for the website address. I haven't had a chance to check out this site, which I'm sure will be a good source of information as DTV day approaches.

Win this great Contrib of the Month Prize!

As an added incentive for readers to contribute to this column, we're now offering a valuable prize to the question judged most interesting, or the answer/response judged most informative, each month. The prize is a Mod-Col 38/54 high-res PAL colour video camera module from sponsor Allthings Sales & Services, with 450 lines of resolution, built-in digital signal processing, electronic shutter and auto gain control — valued at over \$400!

November's What??

I've since received a reply from Bryan Maher concerning the November What?? question, which was about current in a TV picture tube. Here's a question from a reader and Bryan's response. More next month, as we've run out of space.

What is the basis of the assumption that 'the number of electrons (N) in the beam is independent of anode voltage V ...? (Ross Beaumont, email)

This is due to the construction of the electron gun, in which the number of electrons emitted as a beam is determined by the voltage at the control grid. The cathode emits millions of electrons, but if the control grid voltage is sufficiently negative, no electrons will escape. Making the grid voltage less negative increases the beam current, which will be independent of the anode voltage.

What??

I know a lot of readers like mathematical puzzlers, so here's one sent by Youssuf Saad, of Merrylands NSW.

A technician has to buy 100 transistors, and he must spend exactly \$100. There are three types of transistors, each with a different price. The prices are 50c, \$3 and \$5 each. How many of each transistor can he buy for exactly \$100?

Answer to April's What

The answer is that either impedance cable will give similar results. As long as a transmission line is terminated at one end, the insertion loss is the same. This is a fundamental law for transmission lines which is not very well known.♦

CCTV Paks

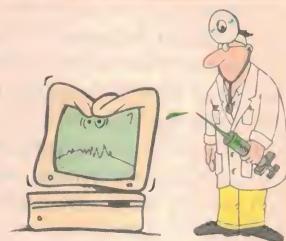
4 Cameras & Switcher from \$533
4 Cams & 12" Mon/Sw from \$639
4 Cams & Digital Sw from \$669
4 Cams & Digi QUAD from \$715

COLOUR

4 Cameras & Switcher from \$919
4 Digital Colour Cameras & Digital 4 x 1 QUAD from \$1338
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Computer Clinic

Got any computer queries? Whatever is bugging you, from hardware problems to C programming, send it in and we'll soon have you fixed up. You can email your question to electaus@magna.com.au, or fax or mail it in to us here at EA.



Y2K problems, a boot about Linux, IP addresses & CGI under NT, Java problems & more...

Win 95 Y2K

I have been checking both my desktop and laptop computers for Y2K compliance and they seem to be okay. Both are running on Windows 95 Version B, and the only program which is acting strangely is File Manager (WINFILE.EXE). Any dates after 1999 show up on screen with symbols in the year instead of the two numbers (e.g. the year 00 is shown as :0, and other years have various symbols such as equal signs and semi colons and the @ symbol).

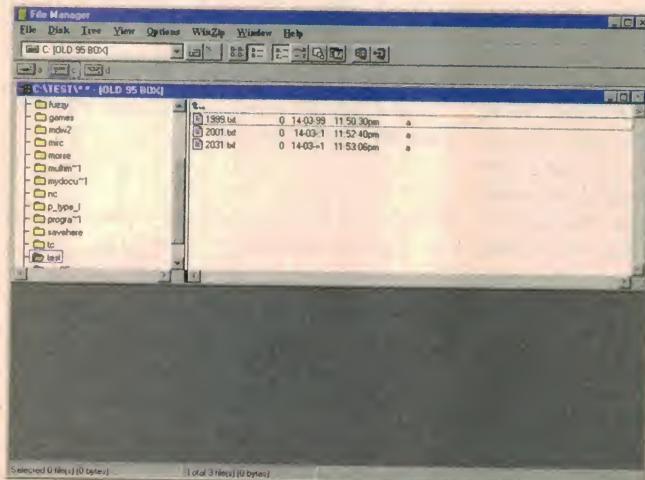
Could you possibly offer an explanation, as this program comes with Windows 95 and there is not a problem with the dates in its equivalent program of

creaking old thing doesn't display icons, can't handle long filenames, and as you point out, just isn't Y2K compliant.

The reason you're getting funny characters in the dates is due to sloppy coding; the program is walking off the end of the numbers in the ASCII table, trying to find the correct digit. It really is showing its age, and it's a bit cruel to keep using it when Windows Explorer is sitting there with all the functionality of File Manager plus loads more features, and none of the bugs.

Unfair to Linux

The Computer Clinic page in the Feb '99 issue is, in a way, inadvertently promoting a view of Linux that it doesn't deserve, as changing the mount type for a Windows 95 partition most certainly does not need a reboot. (And I would be exceedingly surprised if you didn't already know this.) Suggesting a reboot of Linux merely informs the new user that it is normal to reboot a PC when something like this changes, which is characteristic primarily of Microsoft software. In other words, it would be



Windows Explorer. (Christine Moore, Seven Hills, NSW)

Ah — there seems to be a slight misunderstanding here. Program Manager is not the equivalent of Explorer at all; it's a hang-over from Windows 3.1. As far as I know, the only purpose it serves is to support 16-bit programs that rely on having WINFILE.EXE in the Windows directory. Anything that still requires File Manager is pretty much obsolete anyway, so it's a fair bet that you'll never need to use it at all. The

far quicker to do an 'umount/c' followed by a 'mount/c' once /etc/fstab was changed. Despite this, I am encouraged that a largely hobbyist magazine as Electronics Australia is extending its coverage to a hobbyist OS as Linux. (Wade Bowmer, by email)

You are of course absolutely correct, and I do apologize. That's the trouble with Windows — irritating things such as having to reboot the computer after every tiny system modification become so deeply

ingrained, that you forget that it's possible to do things properly.

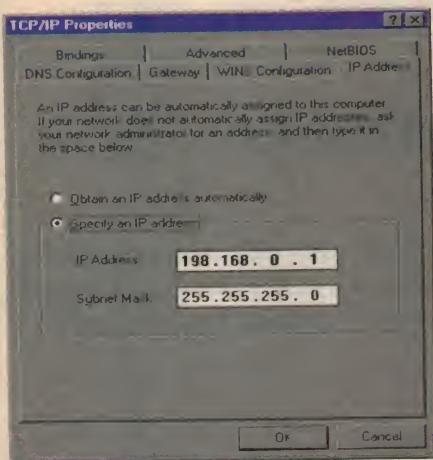
For the born-and-bred PC users out there, Real Computers get rebooted maybe once a year, if operating conditions are particularly horrible. You can do the most appalling things to UNIX/Linux boxes, and never have to turn them off. Some OSes even let you update the kernel itself without missing a beat! Uptimes of over 10 years are quite attainable; all it takes is a professionally designed operating system. Think about that next time an install program needs you to restart your computer...

TCP/IP & CGI under NT

Thank you for an excellent magazine and probably the best computer advice/help page of any magazine. I have a couple of little queries if you could fit them in: When supplying TCP/IP addresses for NT4 off the top of your head for your own intranet, could the numbers you've chosen cause any problems or conflicts when connected to the internet? Also, following your excellent advice on creating interactive web pages and using your fprintf program, I find my computer doesn't seem to process the batch file commands at all. It won't do the 'for' loop and it doesn't even process the '@echo off'; it just displays all these lines on the web page which it returns. (David Hawcroft, by email)

A great article! I now have a server on my machine. I am running Netscape 3 on NT 4, and I have a problem with the DOS batch file. When I open slideshow.html and press 'go', Netscape responds with a message saying 'Document contains no data'. Any suggestions? (Don Watson, by email)

First up, yes David, you can get in a horrible mess if you make up your own IP addresses. There are a finite number of IP addresses out there and if you pick an IP address that has already been allocated, you're in for a bumpy ride. If you're using an ordinary dial-up connection, your internal IPs won't get routed externally, so you shouldn't actually cause problems for anyone else; but you'll still have problems if you try to communicate with



another machine that shares your IP address.

How then *are* you supposed to choose an unassigned IP address? Well, the nice people at the Internet Assigned Numbers Authority (IANA) have foreseen this dilemma, and designated large blocks of the IP addressing space for internal network use only. In this way, anyone who needs IP addresses for their network can simply allocate them from these blocks without causing any problems.

There are three such blocks, but unless you really need millions of separate computers on your LAN, you're best off sticking with the block ranging from 192.168.0.0 to 192.168.255. To keep things simple, set up your first card as 192.168.0.1, the second as 192.168.0.2, and so on. Now just set the Subnet mask on all computers to 255.255.255.0, and you're away.

As for the CGI problems, I didn't have a chance to test the programs out on an NT box at the time of writing, and I failed to take a couple of things into account...

First up, Internet Information Server (IIS) and Peer Web Services (PWS) won't run 16-bit programs through the CGI, so MYCGI.EXE and PRINTF.EXE won't work under NT without some awful kludges. I have recompiled a 32-bit version of PRINTF.EXE, which you can find on the EA web site (<http://www.electronicsaustralia.com.au>) in PRINTF32.ZIP. However recompiling your own MYCGI.EXE as a Win32 executable is left as an exercise for the reader.

There's also a second problem that I overlooked, in that recent versions of IIS and PWS have disabled batch file CGI support due to a rather huge security hole. If your computer is not at risk from outside hacking, you can re-enable batch file support by editing a couple of registry entries. As with all registry editing, make sure you backup first!

Open Regedit, navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Paramet

ers\Script Map, add a String Value, and rename it to '.bat' (without the quotes). Now edit the key, and insert the text 'c:\winnt\system32\cmd.exe /c %s %s' (again, without the quotes). You can now run batch files from your \scripts directory, but there's a small problem. None of the programs that are called by your batch file can send any data back to the client! To overcome this, you have to create a new registry key of type DWORD in HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W3SVC\Parameters, named CreateProcessWithNewConsole, with a value of 1. Now restart the WWW service with the Internet Service Manager, and everything should work nicely.

Update TIMEDATE

Have you continued development of your 'timedate.exe' so that it will handle YYYY (that is, the year 2000, 2001, etc.)? (Darcy H. Currey, by email)

I have now... You can find it on the website in TDY2K.ZIP. I had to leave out the dashes to fit the date into eight characters, so the first of January 2000, for example, will come up as 01012000. Not as pretty, but that's the price you pay.

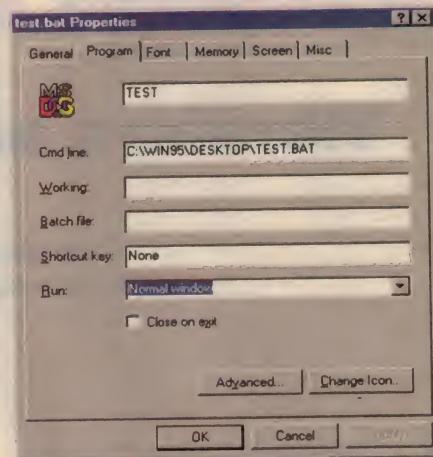
Window.close

I have recently started programming in Java, but the javac.exe window closes on completion, so I don't get a chance to read any error messages. Compiling a 'correct' program, (i.e. one with no errors), works as it should and a class file appears OK, but of course one needs to be able to find one's errors in real life.

I have been told to right-click on JAVAC.EXE, and change the properties so the program doesn't exit, but found there is no option for this in the properties page. I have also tried running it from the MS-DOS prompt, but get a message 'This program can not run under DOS'. Can you suggest any way to tackle the problem? (Eric Anderton, by email)

JAVAC.EXE is a Win32 console application. This means that while you can't run it from DOS mode itself, it is designed to be run from the command line. Go to Start|Programs, and run 'MS-DOS prompt'. This will open up a window with a DOS prompt, without leaving the Windows environment. Here you can type the commands needed to compile your program, and the window will not close until you tell it to.

Alternatively, you can create a batch file containing the necessary command line, and



place it in the folder next to the program. The properties of the batch file will have a 'Close on exit' checkbox, which should in fact be unticked by default anyway.

Corel WordPerfect 8

Software recommendation of the month has to be Corel WordPerfect Suite 8, which I am using to write this column. I know I usually only do free plugs for free software, but I was so impressed with the suite I thought it deserved a mention.

The WP8 suite is a lot like MS office, except that everything works. If you've ever used Microsoft Word to do anything more advanced than a note to the milkman, you probably have less hair than you did when you started. With WordPerfect 8, far more attention seems to have been paid to the way people try to do things, and the interface has been adjusted to suit.

For instance, the Shadow Cursor feature allows you to click anywhere at all on a page and start entering text there, without having to tab across manually. It's little things like this that smooth over the usual irritations, and allow you to get on with the job. There are too many well-thought-out features to list here, but if you use a word processor more than once a week, it could well save your sanity.

The Standard package also includes the Corel Quattro Pro spreadsheet and Corel Central, a rather natty messaging/scheduling app that gives Microsoft Outlook a run for its money.

The only niggle I have with the whole suite is that it is rather sensitive to the general health of your system — I had to do a clean install of 95 to get it to work — and that its Microsoft Word DOC file conversion is not terribly accurate. Other than that, it's a very friendly, full-featured office suite, and I use it exclusively. Oh, and there's even a Linux version, too! ♦

Vintage Radio

Vibrators and vibrator receivers - 1

There are many vibrator powered radios that find their way into swap meets and auction marts. There is a very good reason why they are still to be found in such numbers: they were very practical, for many years...

T HAS BEEN mentioned here before that reticulated 240V AC power did not extend beyond the cities and the major country towns of Australia until about the middle 1960s. By implication, until then most farmers had to rely upon other sources of power — notably the 32V home lighting plant and the 6V vibrator powered radio.

Although radios were produced for 32V DC, six volt vibrator-powered radios were far and away the more numerous, and were really only superseded by the advent of reticulated electricity and the emergence of the new cheaper Japanese transistor radio, which made the purchase of a new accumulator or the repair of the faithful old set uneconomical.

Why 6V, and vibrators?

Firstly, now is as good a time as any to lay to rest an unfortunate misconception. The term 'vibrator' was a wholesome and proper part of a radio man's terminology and was freely discussed by Catholic and Protestant radio men alike. There was no hint of unseemliness.

In this context a vibrator is an electro-mechanical device, which when used with an appropriately designed transformer, formed either a DC to DC converter or a DC to square wave inverter. The former were referred to as a 'synchronous type' vibrator, while the latter were the 'non-synchronous type'. As a rule for radio work, the synchronous types supplied 130V DC or so from a 6V accumulator, as a substitute for the expensive B batteries.

Six-volt accumulators were chosen for three good reasons. Firstly, most cars up to the FJ Holden, in addition to farm machinery, used a 6V system. Charging the battery was merely a case of swapping the radio battery over with the car battery, and by the time the 'cocky' had made a couple of trips to town, the battery was charged.

Secondly, in the case of the 2.0V series of valves, it was possible to design a very convenient series-parallel network for supplying the valve filaments. And thirdly, in the case of car radios, the same valves which were used

in electric sets were likewise used because of the convenience of a 6.0V heater supply.

In an all-battery powered radio, a bank of three 45V dry batteries would last from four to six months, depending on current drain and hours of use, while the 2V accumulator lasted about 6-8 weeks. Vibrators eliminated the need for costly dry B batteries, and changing to 6V avoided the need for special charging arrangements for the 2V accumulator.

The one drawback was that the 6V accumulator only lasted only two to three weeks between charging. However, as we have seen, charging the radio battery was essentially at no cost, to the enterprising farmer!

The basic principle

Now let's have a look at the way vibrators work. Fig.1(a) shows the circuit of a common electric bell or buzzer. The make-and-break action of the buzzer spring (hereafter called the 'reed') and the adjusting screw, causes a pulsating or interrupted DC to flow through the armature coil.

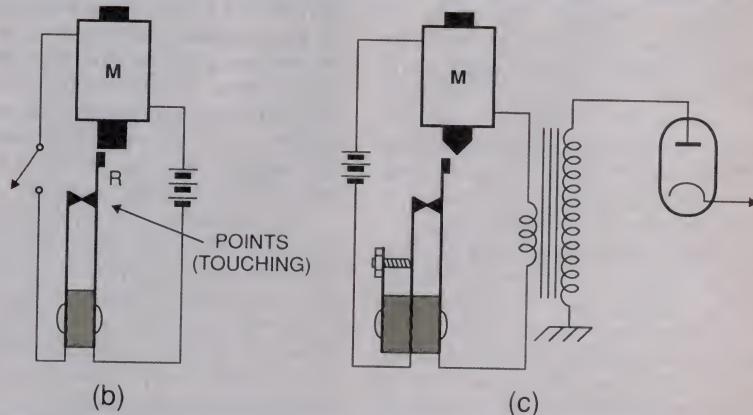
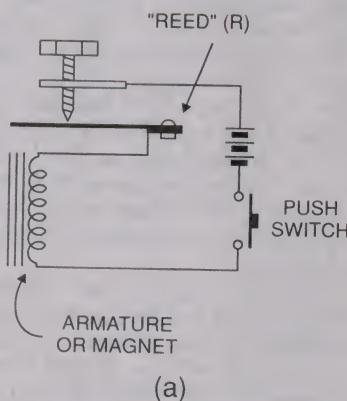


Fig.1: In (a) we see the principle of an electromechanical buzzer, where an electromagnet interrupts its own current. In (b) we see how a non-synchronous vibrator generates the HT in early auto receivers.

..... by Roger Johnson



Fig.2: A closeup of a vibrator cartridge removed from its protective shielding can. The array of adjustments is quite complex, to be discussed next time.

If a secondary winding was wound around the armature coil, a voltage would be induced in the secondary as a result of the collapsing magnetic field when the reed was in the 'break' or 'off' period of the cycle. The frequency of the vibrating reed could be determined by the adjusting screw.

The vibrator cartridge is simply a more sophisticated and elaborate development of this simple buzzer principle.

Fig.1(b) shows a modified arrangement. This time the armature coil is at the free end of the reed, so that the reed can more easily oscillate, and with a greater amplitude. Not only that, the primary contact has a certain resilience. This means that it can accommodate variations of the amplitude of the reed vibration, so that the 'gap' remains more constant. This is important for reasons that will become apparent soon. The system of Fig.1(b) also allows the addition of extra contact points.

As you can see, Fig.1(b) is simply a rearrangement of Fig.1(a). The chief advantage is that it permits additional flexibly mounted contacts on each side of the vibrating reed. These in turn can control other electrical circuits, independent of the driving armature coil.

This is indeed what happens in a vibrator cartridge. The close-up photo in Fig.2 shows a complicated array of contacts as used in a synchronous, or rectifying, cartridge.

Like the ignition points in a car engine, the contacts of a vibrator cartridge open and close literally millions of times during their service life. A vibrator cartridge operating at 115Hz will have over one million contact movements every 2-1/2 hours. Special electrical and mechanical engineering must be undertaken if any sort of longevity is to be anticipated. The engineers of the day aimed at 1500 to 2000 hours of operation.

The early attempts

The development of the ultimate 'modern' vibrator cartridge came as a result of the demand for automobile receivers in the early 1930s. In this instance, the vibrators were used as shown in Fig.1(c). Until then, what car radios there were had to be supplied by separate HT or 'B' batteries (see, for example, Vintage Radio in *Electronics Australia* for June 1998).

These early attempts comprised a single



adjustable resilient contact, in which the energising coil was in series with the primary of the transformer. Half-wave rectification only was possible, and was achieved using a conventional valve.

Since the armature or magnetising (interchangeable words) coil was in series with the transformer primary, this meant that the total primary current was drawn through the armature coil. It therefore had to be of a very low DC resistance. Not only that, the DC resistance of the transformer, and the imbalance of the reflected load during operation, meant that the operation of the reed could easily be disturbed unless the load conditions, transformer primary and armature coil were carefully designed, matched and maintained.

Furthermore, if the 'points' (synonymous with 'contacts') became in any way pitted or corroded, there was an excellent chance that the reed would not commence vibrations at all. This is a classic example of a case where 'giving it a slight whack' may have fixed the problem, by jolting the reed into operation!

Following on from this was an even worse contraption designed to eliminate the rectifier valve. A second set of contacts was placed on the reed — electrically quite separate from the primaries of course — to enable rectification. This model developed the same faults as the early non-synchronous type of Fig.1(c), but with worse results. The secondary contacts tended to arc and pit even more so than the primary contacts.

Fuses and secondary delay relays were sometimes incorporated to give the secondary contacts that fraction of a second delay, in order to get the reed moving before the load was placed through the secondary contacts.

Parallel coil vibrators

A big improvement came with the full wave parallel coil vibrator, of the type seen in Fig.3(a) — which happens to be a synchronous (i.e. rectifying) type. This is the type in common use from about 1936 until the end of the vibrator-powered car radio (1958 or thereabouts) and many a receiver was kept in service until the mid 1960s. Not only that, they were extensively used in military receivers (in particular in WW2) where much development took place in insulating, moisture proofing, sound proofing, and most important of all, providing reliable contacts.

With this type of vibrator the armature coil is wound with many turns of fine wire

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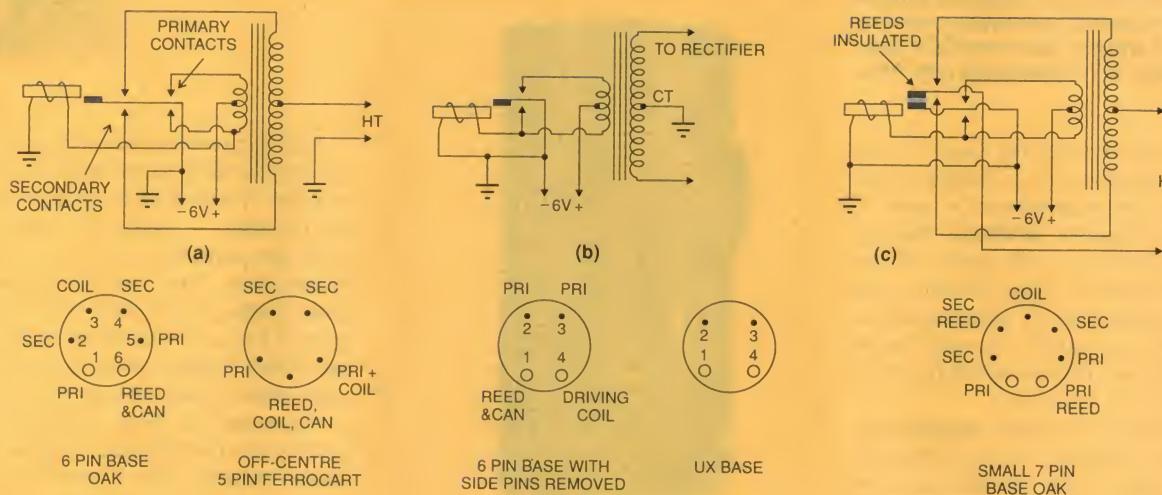


Fig.3: In (a) is shown the basic circuit for a synchronous (rectifying) vibrator supply, while (b) shows that for a non-synchronous vibrator, where a rectifier valve must be used. In (c) is shown how the uncommon split-reed synchronous vibrator was used. Representative vibrator cartridge base connections are also shown, for reference.

to give a much higher DC resistance, suitable for parallel connection with one side of the low resistance DC winding of the transformer primary. The magnetic energy was provided by the large number of turns, with a small current flowing. It will be seen that the contacts are open when the reed is at rest, and that the armature coil is energised via one lead going directly to one side of the DC source (negative), and the other via one half of the transformer primary.

Because of the higher voltage/low current operation, the problems with contact resistance was virtually eliminated — together with starting difficulties.

At switch off, the reed is neutral to all contacts. Immediately a voltage is applied, the armature coil is energised in the manner described above, and when the reed moves to the bottom contact, it shorts out the armature coil. This has two effects, one being that the bottom half of the transformer is now connected to the DC source. So the magnet is effectively switched off, and contact is broken. The spring inertia of the reed moves over to the top contact.

Once the bottom contact is broken, the top half of the transformer primary is still disconnected from its DC source, until connection is made with the top points. As a result of the magnet coil releasing the reed and energising the top half of the primary, the reed in the process of disconnecting itself from the bottom contact allows the armature to be energised again and the armature draws the reed down to the bottom points; thus the whole process is repeated

whilst the primary voltage is connected.

Under these conditions, contact is made alternatively between the reed and the two 'primary' points (contacts), and pulses of DC pass through the respective halves of the transformer winding in opposite directions.

The frequency of vibration is governed by the characteristic of the reed and the pull of the magnetic circuit. Usually, a frequency of between 115Hz and 120Hz is the standard.

The schematic of a vibrator circuit found in many circuits for a full wave non-synchronous (i.e., non rectifying) is shown in Fig.3(b).

Synchronous types

The big advantage of synchronous or rectifying vibrators was elimination of the rectifier tube, thus saving its cost and also eliminating 0.6A of current drain from the accumulator. In a car radio, where the car's accumulator is constantly being charged, this does not pose a problem. However, for a domestic radio, whose drain depends on the number of valves and total HT current, the extra 0.6A becomes quite significant and can shorten battery life by as much as one third.

Returning to Fig.3(a), the secondaries of the transformer are connected by the contacts to the reed, which is always at negative (ground) potential. Assume that at a given instant, the reed is touching the lower primary contact. With the polarities as marked, the lower end of the primary will be negative with respect to the centre tap. If the transformer secondaries are correctly phased, the lower end of the secondary will simultane-

ously be negative for the high tension. The secondary centre tap is therefore positive.

When the reed travels to the top set of contacts, the same thing happens. The reed is at earth, the top of the secondary winding is negative and the centre tap is therefore positive HT.

Because LT negative is common with HT negative, with the standard synchronous vibrator, there can be no attempt at supplying back bias. However, a 'split reed' vibrator cartridge was developed, with a secondary reed. This was mechanically coupled to, but electrically isolated from the primary reed, as shown in Fig.3(c), and this did allow for the provision of back bias. However, circuits and applications for these split reed cartridges are uncommon; the vast majority of domestic radios used a six-pin 'Oak' or five-pin 'Ferrocarr' (made by Astor) synchronous vibrator.

Vibrators and their associated transformers were designed for 4V, 6V, 12V and 32V operation. 32 volt jobs were for home lighting plants, whilst the vast majority of domestic radios used the 6V type — with the principal exception of AWA who, for two or three years, preferred 4V types. The 12 volt types were used for car radios with 12V systems, and were mostly non-synchronous.

In closing, I should mention that the schematics of Fig.3 only illustrate the basic concepts of vibrator operation. No mention has been made as yet of filtering and associated circuitry. We'll look at these aspects in the near future. ♦



New Books

Primer on RF EMFs

RADIO FREQUENCY RADIATION, Issues and Standards, by William F. Hammett. Published by McGraw-Hill, 1997. Hard covers, 237 x 160mm, 195 pages. ISBN 0-07-025929-1. RRP \$140.

With a lot of public awareness, confusion and anxiety about the potential health risks associated with RF radiation from things like cellphones and their associated tower-mounted antennas, a book like this can provide a valuable reference for responsible people on both 'sides' of the ongoing controversies. The author is a professional engineer and consultant based in San Francisco with considerable experience in this field, who has often been called upon both to perform tests and to give expert evidence in local government and health body hearings.

As he explains in the preface, the aim has been to produce a source of calm, factual and technically sound information about the potential hazards of RF electromagnetic radiation, and the measurement and regulation of exposure to it by humans. He has not attempted to 'take sides' with regard to the many disputes that continue to arise in this field, but says he has striven instead to stick to what he describes as 'the underlying scientific truth' in all such disputes, at least in so far as it can be determined at the current state of knowledge.

The basic idea has been to provide the reader with basic technical information about RF and its interaction with the 'human receiver', plus further information about the prevailing standards, the accepted methods of assessing exposure levels in specific cases, and finally the various mitigation measures that can be taken in cases of excessive exposure. (Needless to say the standards referred to are primarily those applying in the USA, but these are not all that different from those here.)

The technical level is deliberately pitched so that reasonably intelligent lay people should find it accessible, while engineering professionals shouldn't find the simplifications too irritating or off-putting. The emphasis is on accuracy and clarity, in other words, rather than sheer erudition.

Overall I believe the author has succeeded quite well in giving a solid and dispassionate, yet accessible primer on RF EMFs, their potential biological interactions and the

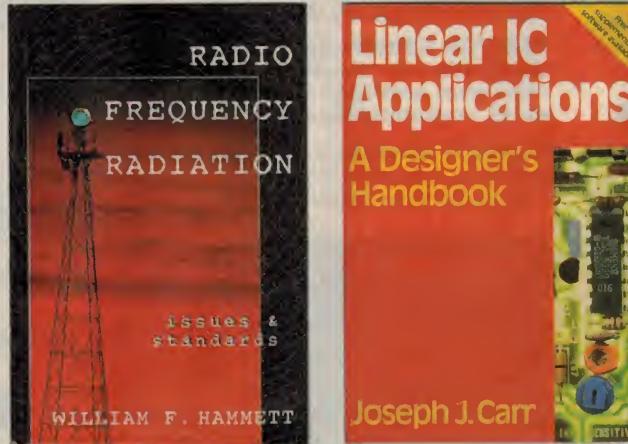
basic techniques for their measurement and assessment. It seems a little pricey considering its modest size, but it should make a valuable reference for anyone wanting to act responsibly in this controversial area.

The review copy came from McGraw-Hill Australia, PO Box 239, Roseville NSW 2069. (J.R.)

Analog electronics

LINEAR IC APPLICATIONS, A DESIGNER'S HANDBOOK by Joseph J. Carr. Published by Butterworth-Heinemann, 1996. Soft cover, 178 x 234mm, 352 pages. ISBN 0-7506 3370. RRP \$70.

At first glance this book appears to be yet another one about op-amps, but the author has clearly tried to make it 'different' from the rest. He starts by assuring the reader that



analog electronics is by no means dead, and points out that a 'major supplier' of special-purpose linear ICs is experiencing the same growth with its analog products as its digital

ICs. He gives examples where analog electronics is either essential or cheaper than digital, and throughout the book sticks with today's applications for linear ICs. Other books tend to wash over this, often leaving you wondering why you are studying analog electronics.

The book is aimed at technician level students (TAFE or first year university) and has learning objectives and a pre-test at the start of each chapter, with questions at the end. The topics covered are fairly standard, and include op-amp applications like precision rectifiers (Carr calls them precise rectifiers), integrators, differentiators, log and anti-log circuits, instrumentation amplifiers, analog multipliers and dividers, audio circuits and active filters. There's also a comprehensive chapter on the 555 timer, with other chapters covering IC data converter circuits and troubleshooting.

Because the applications described in the book are typical of what's happening today rather than 20 years ago, you tend to get a feeling that analog electronics is still vital and exciting. Of course, many of the circuit configurations go back more than 20 years, but knowing these are still relevant helps a great deal when learning them.

The book is well illustrated, has a friendly writing style and comes with a free software offer. The software can be downloaded from Butterworth-Heinemann's website at: <http://www.butterworth.heinemann.co.uk/carr/carr.html>. The review copy came from Butterworth-Heinemann of PO Box 146, Port Melbourne 3207, but we understand that it's now distributed directly from the UK. (P.P.) ♦



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Electronics Australia is one of the longest-running technical magazines in the world. We started as *Wireless Weekly* in August 1922 and became *Radio and Hobbies in Australia* in April 1939. The title was changed to *Radio, Television and Hobbies* in February 1955 and finally, to *Electronics Australia* in April 1965. Here are some interesting items from past issues:

50 years ago

May 1949

Australia Sees Television: During the last few weeks Australians in Sydney and Melbourne have been able to see television for the first time. Electronic Industries, in conjunction with the English Pye radio company and sponsored by the Shell company, gave the demonstrations as a publicity stunt — one which went over in a big way.

Most of the radio trade was very annoyed with Electronic Industries for staging the demonstration. Fearing that too much talk about television would spoil the sale of radio sets and unsettle the public, the trade had agreed not to publicise television until transmitting stations were on the way and there were goods to sell. They were encouraged in this by the Government.

Accurate new clock: Molecules of ammonia gas, vibrating at their natural frequency, control a new clock which is accurate to within one second in eight months. Developed by the US National Bureau of Standards, the ammonia clock will make a notable contribution to many branches of modern science. The new development uses an absorption frequency of ammonia to hold a microwave signal fixed in frequency.

25 years ago

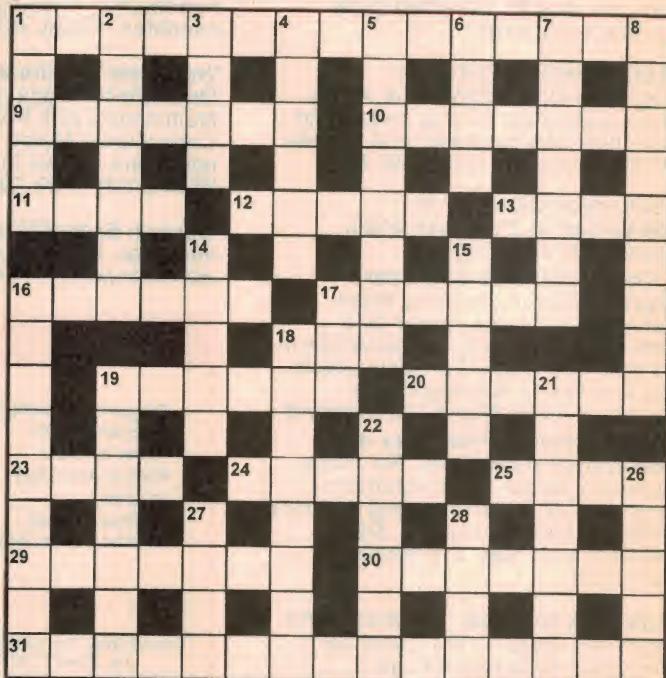
May 1974

FM on VHF within two years: FM on UHF received a knock-out blow with the release of the report of the Independent Inquiry into FM broadcasting. It has been accepted by the Australian Government that FM on VHF will form the basis of a service to be initiated within the next two years, at most.

The inquiry's report favoured VHF/FM on three major grounds: cost benefits, speed and ease of starting up the service, and conformance with international frequency allocations. It recommends a limited introductory service in some areas in the 92-94MHz space as soon as practicable, with regular service in that space within two years or so. This would be expanded to take in the 7MHz between 101 and 108MHz as Channel 5 services are gradually shifted to other frequencies.

Colour Transmitter Contract to AWA: Six colour television transmitters have been ordered by the Australian Post Office from Amalgamated Wireless (Australasia) Ltd for the Australian Broadcasting Commission. The transmitters, which will be used as three parallel pairs at sites in Sydney, Canberra and Hobart, will be installed this year and will be ready for the colour service when it begins in March 1975. Of the latest design, they are being manufactured at AWA's North Ryde works ♦

Crossword



ACROSS

- 1 Compound used as an RF semiconductor. (7,8)
- 9 Pioneer of radio transmission. (7)
- 10 Conducted oneself! (7)
- 11 Set coils in place. (4)
- 12 Room for learning, computing, etc. (5)
- 13 Staff symbol indicating pitch. (4)
- 16 Sound generator. (6)
- 17 Famous Greek mathematician. (6)
- 18 Countermeasures for electronic warfare. (1,1,1)
- 19 Transmitted data. (6)
- 20 Type of valve. (6)
- 23 Base for common plastic. (4)
- 24 Spread wires, etc. (5)
- 25 Driving mechanism. (4)
- 29 Again remove data. (2-5)
- 30 Problem solving ability. (4-3)
- 31 HP peripheral product. (8,7)
- 6 Cause of TV ghosting. (4)
- 7 Not legal; not allowed. (7)
- 8 The symbol indicates limit of recorded material. (3-2-4)
- 14 Bring together. (5)
- 15 Warning signal. (5)
- 16 Unit of activity of a radionuclide. (9)
- 17 Emitter-coupled logic. (1,1,1)
- 18 Part of headset. (8)
- 19 SI unit of electrical conductance. (7)
- 21 Monostable. (3-4)
- 22 Copy of data. (6)
- 26 Supports an antenna. (5)
- 27 Word on traditional aneroid barometer. (4)
- 28 Places where rays are concurrent. (4) ♦

April's solution:

Y	E	A	R	T	W	O	T	H	U	S	A	N	D
T	B	R	S		N	M							
T	H	O	R	I	U	M	A	N	D	G	A	T	W
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M	I	C	R	O	D	O	T	C	O	M	S	A	T
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B	O	O	L	E	A	E	L	E	T	R	O		
R	M	N	R	N	R	N	R	M					
A	B	B	R	E	V	I	A	T	E	D	D	A	T

Down

- 1 George, renowned cosmologist and biologist (1904-68). (5)
- 2 Nobel prize-winner (1902). (7)
- 3 Domestic electrical appliance. (4)
- 4 A half. (6)
- 5 Element 37, an alkali metal. (8)

Electronics Australia's

Professional Electronics

**IBM advance will allow
'system on a chip' products**

**Intel launches Pentium III,
AMD reveals K6-III processor**

**Toshiba develops prototype of
non-volatile 'Chain FRAM'**

**LED Illuminator kits are low
in cost, versatile & suitable
for both visible & IR lighting**

**An informal affair: LinuxWorld Expo 99,
celebrating the 'coming out' of Linux...**



highlights News

IBM advance will allow 'system on a chip' products

IBM's MICROELECTRONICS Division has announced a major advance in semiconductor technology that will significantly enhance the performance of electronic products, from personal computers to cell phones to video games, and will make these products smaller and less expensive. The new technology allows for complete electronic systems to be built on a single silicon chip.

Capitalising on IBM's leadership in copper interconnect technology, the company has found a way to efficiently place both logic and memory circuits on a single piece of silicon. Until now, the two functions have normally been provided on separate chips, adding complexity and cost.

With IBM's technology, 24 million gates — equal to as much as eight times the processing and two to four times the memory found on today's typical PC — can be packed on a single chip. This removes a major hurdle in the electronics miniaturisation race, clearing the path to eventual 'system-on-a-chip' products and a new wave of pervasive computing devices.

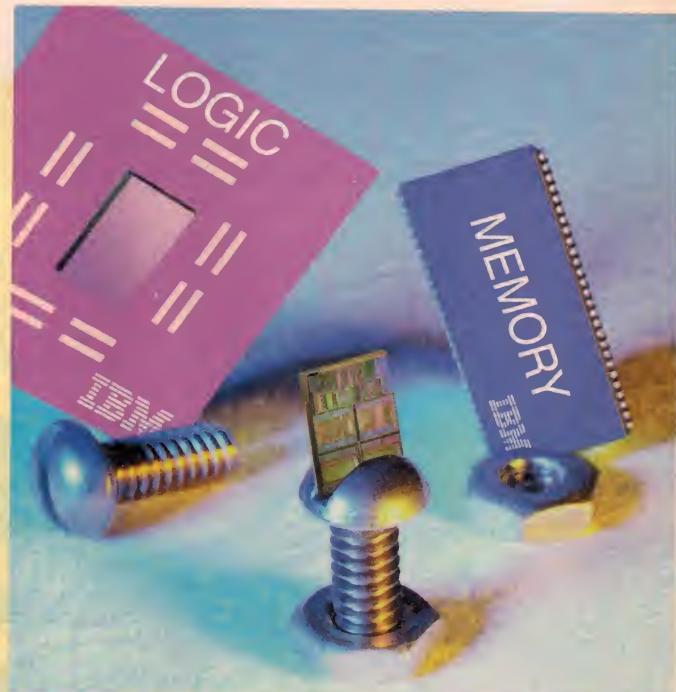
Previous approaches using aluminum wiring typically yielded chips that compromised the function of logic or memory or both. Using IBM's unique combination of copper wiring and 'trench cell' DRAM memory design, chips can be built that not only maintain logic function, but actually improve memory capability as much as 10-fold, making this integration viable for the first time for a wide range of applications. IBM's thinner copper wiring is used to create circuitry as small as 0.15um (less than 1/600th the width of a human hair) and place those circuits closer together, accommodating more logic. The small size of IBM's memory cells allows them to be added to the chip without interfering with the maze of copper wiring or logic transistors.

Intel launches its Pentium III processor

INTEL CORPORATION has announced the Pentium III processor, claimed as the first microprocessor designed to power a new internet experience filled with rich audio, video, animations and 3D. The new processor is available immediately at 450 and 500MHz speeds, while the 550MHz version will be available in second quarter 1999.

"The Pentium III processor enables the most powerful personal computers for running media rich software both on and off the internet in the home and in business," said David Bolt, general manager, Intel Australia. "Users can expect to find fully configured systems at prices starting below A\$4,000, along with a wealth of optimised web sites and software applications."

For users who interact with the internet or data-rich applications, the most important advances are the Pentium III processor's internet Streaming SIMD Extensions — 70 new instructions that dramatically enhance the performance of advanced imaging, 3-D, streaming audio, video, and speech recognition applications. The 500MHz Pentium III is claimed 93% faster than the 450MHz Pentium II on



IBM will first make this new embedded memory available in a custom chip template dubbed SA-27E. IBM is the industry leader in complex ASIC chips, with current designs as large as 13 million gates and an average gate count per design of about 1.5 million. This compares to an industry average of about 500,000. Customised ASIC chips are growing in use, with applications covering computers, telecommunications, gaming equipment, automotive, high-end instrumentation, portable devices and consumer electronics.

CPU intensive 3-D calculations, as shown by Ziff-Davis' 3D WinBench* 99 transform and lighting test. Using Future Reality's MultimediaMark* benchmark, which tests system multimedia performance, the 500MHz Pentium III is 42% faster than the 450MHz Pentium II.

A somewhat controversial 'feature' of the Pentium III is a new selectable serial number feature that, when enabled, works in conjunction with security solutions to provide for more secure internet transactions. Corporate IT managers will be able to use the processor serial number feature to enhance asset management, making it easier to track PCs and applications on the network, as well as manage information better and control access to sensitive corporate data.

The Pentium III processor core has 9.5 million transistors, is based on Intel's advanced P6 microarchitecture and is manufactured on 0.25um process technology.

Hewlett-Packard to split in two

HEWLETT-PACKARD's Chairman, President and CEO Lewis E. Platt has announced plans for a 'strategic realignment' of the company that will create two independent companies.

"We are taking this action to sharpen the strategic focus of our businesses, improve their agility and increase their responsiveness to customers and partners", said Platt. "This will offer exciting opportunities for our employees and will enhance the two new companies' growth and earnings potential."

"We are creating two distinct and strategically focused enterprises, one focused on the measurement businesses, the other on the computing and imaging businesses", said Platt. "These new companies will be financially strong and independently managed, each with its own board of directors and its own central research-and-development organization. Both companies will be able to better focus on growth in their individual markets. They will be well-positioned to build value for their stockholders, customers and employees."

The new measurement company will comprise HP's industry-leading T&M, components, chemical-analysis and medical businesses. These businesses represented \$7.6 billion of HP's total revenue of \$47.1 billion in fiscal 1998. A name has not yet been selected for the new measurement company, but Edward W. (Ned) Barnholt, currently HP executive VP and general manager of the Measurement Organization, has been named CEO.

The new computing and imaging company will continue to operate under the Hewlett-Packard name and will include all of HP's enterprise computing systems, software and services, personal computer, and printing and imaging solutions businesses. These businesses will operate more autonomously and will adapt quickly to changing market needs.

Platt, who drove the plan to create two companies, will continue as HP chairman, president and CEO, and will manage the transformation until the separation is completed.

EL panel pact for Sanyo & Kodak

USED IN CAMERAS, portable telephones and car navigation screens, advanced flat-panel displays using organic electroluminescence (EL) are now being developed by Sanyo Electric and Eastman Kodak. In an alliance between the two companies, they will manufacture so-called 'next generation' screens using organic EL technology. These displays will be brighter and consume less energy than the liquid crystal, flat-panel displays currently in use.

Sadao Kondo, President of Sanyo Electric, said the market for organic EL displays is estimated to be \$US2.67 billion by 2001. He went on to say that Kodak and Sanyo don't expect their own market share to be that large as they plan to licence out their technology.

Both companies intend to start producing the less advanced passive displays by mid 2000. The more compact, brighter and lower energy consuming, full colour active displays will be in production by 2001.

Under the terms of the alliance, Kodak will contribute its patented technology for creating organic EL displays while Sanyo will use its own method for formatting driver circuits to create the panels. Sanyo will then manufacture and market Sanyo branded organic EL passive and active displays under licence from Kodak.



ADI & Intel to develop DSP technology

INTEL CORPORATION and Analog Devices, Inc. have signed a joint development agreement to design a Digital Signal Processing (DSP) core architecture, which will result in a fixed-point, low-power DSP core ideal for processing video, image, voice and data in emerging embedded communications and internet appliances.

"With the rapid convergence of digital communications and computing, Intel decided to invest in signal processing to include a dedicated DSP core that complements our existing embedded solutions", said Ron Smith, corporate VP and general manager of Intel's Computing Enhancement Group. "We sought a collaborator to expedite achieving this goal and with their expertise and experience in DSP technology, Analog Devices fits the bill."

"Intel is widely recognized as being the world's leader in microprocessor technology", said Jerald G. Fishman, president and CEO, Analog Devices. "We are delighted by this opportunity to collaborate with them. We believe that combining Intel's experience in attracting developers with Analog Devices' record of delivering industry-leading DSP technology will deliver the platform of choice in the DSP market."

Under terms of the agreement, Intel and Analog Devices will combine design engineering teams from both companies into a joint design group primarily located in Austin, Texas. The team will be dedicated to the design of a DSP core, programmers' tools, and algorithms necessary to proliferate third-party development and OEM adoption in vertical and general-purpose markets. The joint design group is scheduled to be formed immediately, and the first core design is expected to be completed in the second half of 2000. Though the two companies will collaborate on the core design, they will separately market and sell products from it.

AMD reveals its new K6-III processor

AMD HAS INTRODUCED its highest performance x86 microprocessor for desktop PCs: the AMD-K6-III processor with 3DNow! technology. The company has begun volume shipments of the 400MHz version of the processor and is sampling the 450MHz version to OEM customers. Desktop systems based on the AMD-K6-III processor will be available from leading PC makers, including Compaq.



The AMD-K6-III processor is claimed to outperform Intel's new Pentium III by more than one speed grade on leading business and consumer applications, according to the Ziff-Davis Winstone(R) 99 benchmark.

"The AMD-K6-III processor with 3DNow! technology is the ultimate sixth-generation PC processor for consumer enthusiasts and business power users", said S. Atiq Raza, AMD co-chief operating officer and chief technical officer. "By combining AMD's innovative 3DNow! instructions with our new TriLevel Cache design, the AMD-K6-III processor delivers industry-leading performance in the Microsoft Windows 98 and Windows NT environments, and enables a superior 3D visual computing experience."

AMD's innovative TriLevel Cache design maximises the overall system performance of AMD-K6-III processor-based desktop PCs by delivering one of the industry's largest maximum combined system caches. This larger total cache results in higher system performance.

The TriLevel Cache design includes a full-speed 64KB Level 1 (L1) cache (a standard feature of the AMD-K6 processor family), an internal full-speed backside 256KB Level 2 (L2) cache, and a 100MHz frontside bus to an optional external Level 3 (L3) cache on

the Super7 motherboard.

The 21.3-million transistor AMD-K6-III processor is manufactured on AMD's 0.25um, five-layer-metal process technology using local interconnect and shallow trench isolation at AMD's Fab 25 wafer fabrication facility in Austin, Texas. It is packaged in a 100MHz Super7 platform-compatible, 321-pin ceramic pin grid array (CPGA) package using C4 flip-chip interconnection technology.

First SiGe PA chip for GSM phones

TEMIC SEMICONDUCTORS has announced the first 3V silicon-germanium (SiGe) power amplifier device (TST0912) for mobile phones based on the Global System for Mobile communications (GSM). Using the SiGe technology, the power amplifier is claimed to exhibit the best tradeoff of power, efficiency, size and cost available today.

The TST0912 is designed for single-band operation in the 900MHz frequency range (GSM 900). The 3V operation enables cell-phone designers to use single-cell Lithium-Ion or three-cell Nickel-Metal Hydride (NiMH) battery technologies for smaller and lighter handsets. Since SiGe does not require negative supply voltage as needed by competing devices using gallium arsenide (GaAs) technology, both system and production costs can be reduced.

The new power amplifier offers 35dBm maximum output power as required for GSM handsets. Its power-added efficiency (PAE) value is 50%, allowing for longer talk times. The device is the first member of a family of GSM power amplifiers based on the SiGe technology. Temic Semiconductors is a wholly-owned subsidiary of Atmel Corporation, and has ISO-9001 certified manufacturing facilities located in Heilbronn, Germany and Nantes, France.

CSIRO wants Oz spring terminal maker

CSIRO'S DIVISION of Building, Construction & Engineering (DBCE) provides research, consulting and testing services in many facets of the construction, engineering, utilities and transport industries. One of these is the Fire Testing & Assessment group which has developed comprehensive testing facilities, many of which are NATA registered, to undertake a wide range of tests for industry based on International (ISO), Australian (AS1530 etc.), British (BS 476, etc.), American (ASTM, UL, NFPA, FM), IMO and other standards.

Most of the fire tests use type K thermocouples (in some cases up to 200 or so) for the test specimen and furnace temperature sensing, and Datatakers for temperature recording and logging. Each fire test

specimen may have a unique setup and is generally no longer than four hours duration, so there is a need for rapid thermocouple wiring up and disconnection from the Datatakers.

Some years ago the Division had some terminal panels constructed, consisting of 20 pairs of spring loaded terminals (similar to the old B&W TV antenna connectors) manufactured from type K Chromel and Alumel rod material and red and yellow plastic. However in the near future they are building new fire test laboratories and as part of the re-instrumentation want to use similar panels with 50 and 100 pairs of terminals on each.

The total quantities are likely to be 1000 of each type, in a 'high temperature' (105°C+) plastic. They'd like to hear from any Australian manufacturer that might be interested in assisting them. The contact is TO Jim Hooke, CSIRO Division of Building, Construction & Engineering Fire Testing & Assessments, Riverside Corporate Park, 14 Julius Avenue (off Delhi Road) North Ryde 2113 or phone (02) 9490 5440.

Toshiba develops Chain FRAM proto

JAPAN'S TOSHIBA Corporation has developed the world's first prototype of a nonvolatile Chain Ferroelectric RAM (Chain FRAM). The breakthrough design surpasses the performance achieved by current FRAMs and combines high-speed read and write operations with a small chip size.

In Toshiba's prototype chain FRAM, each individual memory cell consists of a single transistor and a single ferroelectric capacitor in parallel, while a cell block consists of eight cells connected in series. This configuration achieves distinct advantages in performance and size over conventional FRAM.

In operation, the new FRAM achieves the world's fastest operating times, with a random access time of 37ns and a read/write cycle time of 80ns — a performance equivalent to a standard DRAM. The prototype chip is only 86% the size of current FRAMs. Further miniaturization can be anticipated, as the chip's stacked transistor design supports a theoretical reduction to 55% of the current size.

Toshiba also reported that the cell block can be expanded to a maximum of 16 cells, which will achieve further gains in performance.

FRAMs are seen as having high potential, as they match the nonvolatility of flash memory while far surpassing it in operating speed. However, conventional FRAM connect the data-holding capacitor in series with the transistor. The result is a large cell size. Additionally, the conventional FRAM needs a separate driver for each capacitor, producing

drive times longer than found in conventional DRAMs.

The chain FRAM prototype overcomes problems with conventional FRAM design and opens the way to high-speed, low-cost devices. Toshiba expects to see it widely used in such applications as mobile information equipment and IC cards, including e-money cards. ♦



Above and below: two shots taken by RCS Radio's Bob Barnes at this year's Central Coast Field Day, held at Wyong racecourse on February 28. Although the actual numbers attending this premier annual amateur radio event may have been slightly down on previous years, traders reported that sales were up.



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HURRY! OFFER ENDS JUNE 1, 1999

The Tektronix TX3 Multimeter is one of the new TX-DMM™ family of handheld true RMS digital multimeters. The new flagship DMMs simplify measurement tasks with an innovative design that provides an easy-to-use interface, one of the largest digital readouts available and Windows 95/NT compatibility. Also available (and included in the prize package) is the WSTRM PC interface package, consisting of an optically isolated PC interface cable and WaveStar™ for Windows 95 software. The WSTRM's remote capabilities convert the TX-DMM™ multimeter into a virtual instrument and data acquisition system.

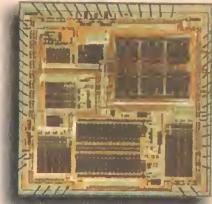
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CONDITIONS OF ENTRY: 1. The competition is open to Australian residents submitting a new or renewed subscription to Electronics Australia magazine. Employees of IPMG, Tektronix, their subsidiaries and families are not eligible to enter. 2. Prizes are not transferable or exchangeable and may not be converted to cash. 3. The judge's decision is final and no correspondence will be entered into. 4. The competition commences on March 15, 1999 and closes last mail on May 18, 1999. 5. The draw is at the promoter's premises on June 1, 1999 at 11am and the winners will be announced in the Public Notices section of the Australian on June 3, 1999, and notified by mail. In the event of any unclaimed or unwanted prize, a second chance draw will be conducted on October 1, 1999, subject to Reg. 37 of the Lottery & Gaming Regulations 1993 (SA). 6. The prize is one of six Tektronix Multimeters and software valued at \$1,239.52 r.r.p. each. Each prize package comprises a Multimeter valued at \$786.90 (inc. sales tax) and software valued at \$452.62. Total prize value \$7,437.12. The promoter is FPC Magazines, 180 Bourke Road, Alexandria NSW 2015. 9. All entries become the property of FPC Magazines, and may be used for future marketing purposes. NSW Permit No: TC99/1328; ACT Permit No: TP98/2638; NT Permit No: NT99/449 SA Permit No: T99/449; VIC Permit No: 99/392 issued on February 22, 1999.

Solid State Update



Keeping you informed on the latest developments in semiconductor technology

Integrated video processor for CCDs

The Analog Devices AD9803 is a complete CCD and video signal processor featuring an 18MHz correlated double sampler (CDS), a low-noise programmable gain amplifier (PGA) with 0 - 30dB gain range, black level correction circuit and a 10-bit, 18MHz analog-to-digital converter (ADC). On-board clamping circuitry, PGA and voltage reference circuitry make the AD9803 easy to design into electronic camera circuits as well as video and still camera applications.

The AD9803 provides camera designers with a compact, low-power (180mW) solution. An additional input mode includes a clamp and PGA to meet the record/playback channel requirements for camcorders as well. The on-board CDS, PGA and other circuitry of the AD9803 reduce external part count, lowering the cost of the circuit. A three-wire digital interface allows programming of the internal registers, increasing circuit flexibility. The AD9803 operates from a 3V supply.



For more information circle 271 on the reader service card or contact Analog Devices, Suite 4/1621 Point Nepean Road, West Rosebud 3940.

'World's fastest op-amp on 1mA'

Analog Devices has released the AD8014, a new 400MHz low power, high performance op-amp using a revolutionary current-feedback architecture to attain new levels of combined bandwidth, power, output drive and distortion. The proprietary circuit architecture enables the highest performance amplifier at the lowest power, at a cost of only US\$1.19 in 1000-piece quantities.

The AD8014 is a very high speed amplifier with 400MHz -3dB bandwidth, 4000V/us slew rate and 24ns settling time to 0.1%. This temperature-stable, easy-to-use amplifier with 60ns



overload recovery has extremely low voltage and current noise (3.5nV/√Hz and 5pA/√Hz, respectively), as well as low distortion (-70dB THD @ 5MHz). These features make the AD8014 well-suited for wide-band signal processing applications. With just 1mA supply current, this multi-purpose op-amp is also well suited for any power-sensitive, high-speed system, including battery-operated equipment.

For a low power amplifier the AD8014 also has outstanding drive capability, with the ability to drive 2Vp-p video signals on 75Ω or 50Ω series terminated lines and still maintain more than 135MHz -3dB bandwidth.

For more information circle 272 on the reader service card or contact Analog Devices, Suite 4/1621 Point Nepean Road, West Rosebud 3940.

Dual 12-bit ADCs for motor control

Burr-Brown's new 12-bit dual 500kHz analog-to-digital converters, the ADS7861 (serial interface) and the ADS7862 (parallel interface), feature four fully differential input channels grouped into two pairs for high speed simultaneous sampling signal acquisition.

Designed specifically for motor control and power management applications, the devices provide a high speed, low cost solution that samples twice as fast as the competition, while dissipating only 40mW of power. In a three-phase motor control system, for example, the ADS7861 and ADS7862's four-channel/two-pair input gives the designer the ability to monitor and adjust two critical variables (such as voltage and current) at the same time. Additionally, when operating these devices from a common reference, the simultaneous sampling of the voltage and current provides the opportunity to double the data conversion throughput rate to an effective sampling rate of 1MHz.

The ADS7861's serial interface makes the

device ideal for applications requiring small component size by eliminating the need for multiple output lines. If output speed is an issue, the ADS7862 provides all the features and performance of the ADS7861 with a parallel interface. Both devices feature four input channels, fully differential inputs, 2us total throughput, 500kHz sampling rate on a single channel and low power (40mW).

For more information circle 273 on the reader service card or contact Kenelec, 23-25 Redland Drive, Mitcham 3132.

Low power 8-channel bidirectional coupler

Burr-Brown's new ISO518 is an eight channel, isolated bidirectional digital coupler which offers the ability to transmit data in both directions across the isolation barrier. The low power, single component device replaces multiple optocoupler-based solutions — allowing a reduction in component count of up to 40:1 and a smaller overall package area.

The ISO518 features Burr-Brown's innov-



ative capacitive barrier technique, which has several advantages over optical coupling techniques: lower power consumption, reduction in printed circuit board (PCB) area, and lower overall system cost. In a 16-channel isolated bus, the ISO518 offers a 70% saving in power consumption and an 80% saving in PCB area compared with optical isolation.

The ISO518 is designed with input and output buffers for ease of integration into a microprocessor bus system. This feature, which allows multiple access to a data bus, requires extra circuitry when using an alternative solution.

The ISO518 features low power consumption (<12mW per channel typical), 1500V RMS isolation, a transfer rate of up to 2 million 8-bit words/second without skew problems, tri-state outputs, and double-buffered design for

easy integration into bus-based systems.

For more information circle 274 on the reader service card or contact Kenelec, 23-25 Redland Drive, Mitcham 3132.

SO-8 voltage inverter needs no inductor

The new Analog Devices ADP3605 is a voltage inverter that operates from a 3V to 6V supply and provides a regulated output with minimum voltage loss, while minimizing the number of required external components and eliminating the need for an inductor.

Housed in small SO-8 and TSSOP-14 packages, the ADP3605 operates at a high switching frequency of 250kHz (500kHz internal). This enables the charge pump to use very small external filter capacitors. The ADP3605's space-saving inductorless feature enables designers to implement the 'thin' design desired in a wide range of battery-powered and portable applications as well as add-on cards, disk drives and other computer peripherals.

The ADP3605 comes in both fixed -3V and adjustable (-3V to -6V) output versions. One resistor sets the output voltage of the adjustable version. An output current of 120mA can be achieved while maintaining a guaranteed output accuracy of +/-5%. A logic level change on the shutdown pin disables the output, producing a low 2uA of quiescent current.



For more information circle 275 on the reader service card or contact Analog Devices, Suite 4/1621 Point Nepean Road, West Rosebud 3940.

SOT-23 power MOSFETs have low on-resistance

Vishay Siliconix has announced a family of record-setting SOT-23 power MOSFETs, including the industry's first 60V P-channel device in this package type. Built on the firm's high density TrenchFET technology, the new LITTLE FOOT products are a small but powerful replacement for MOSFETs in the DPAK and other large packages often used in mobile computing, battery pack, data storage, automotive, and industrial applications.

The 30V Si2306DS (N-channel) and



Si2307DS (P-channel) devices provide maximum on-resistance of just 57 milliohms and 80mΩ respectively, a new record for any power MOSFET in the SOT-23 package. Maximum current handling is 3.5A for the Si2306DS and 3A for the Si2307DS, making these devices ideal as load switches or output drivers for hard disk drives and new media storage devices, industrial controllers, barcode scanners, and even high-end toys.

The 60V N-channel Si2308DS and P-channel Si2309DS offer maximum on-resistance of 160mΩ and 250mΩ respectively, an order of magnitude lower than any competing SOT-23 device with this drain-source voltage. With thermal impedance ratings comparable to the much larger DPAK devices that the Si2308DS and Si2309DS can replace, the new devices will allow dramatic space savings in automotive and industrial motor control applications, including burglar alarms, air bag actuators, injector drivers, electric seats, industrial controllers, artificial limbs, and milking machines.

Despite their small size, all four devices can dissipate up to 1.25W.

For more information circle 276 on the reader service card or contact distributor Braemac, 1/59-61 Burrows Road, Alexandria 2015.

First power MOSFETs operating at 1.8V

Vishay Siliconix says it has removed a major hurdle in the development of lower system voltages for mobile communications and computing products, with the release of the industry's first power MOSFETs that can operate from voltages as low as 1.8V.

Twelve 1.8V power MOSFETs are now being sampled. All are P-channel devices, and all set new records for on-resistance at 1.8V, 2.5V, and 4.5V gate drives. The new Si4465DY in the SO-8 package, for example, offers on-resistance of 9mΩ at 4.5V, 11mΩ at 2.5V and 16mΩ at 1.8V. Compared with previous state-of-the-art power MOSFETs, this represents an improvement of 38%.

The new 1.8V devices are available with 8V or 12V drain-source voltage ratings.

For more information circle 277 on the reader service card or contact distributor Braemac, 1/59-61 Burrows Road, Alexandria 2015. ♦

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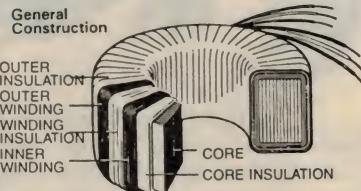


Announcing the new DVSSc and DVSSs high performance D.A.'s with many features usually only found in Pro equipment. Both models have a stereo audio section with separate controls for left and right levels, five low impedance stereo outputs capable of driving long cables, very low noise and distortion, wide bandwidth and a front panel 3.5mm stereo headphone/line level monitoring output & volume control. The video section of the DVSSc is for composite video with all connectors being RCA's and that of the DVSSs is for S-Video (Y/C) with the usual miniature 4-pin sockets. The video inputs and outputs on both models are 75 ohms. Video

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New Products

New high quality AV cables from DSE

With the increasing popularity of home theatre systems and the re-emergence of hi-fi separate components, comes the need for high quality cables to connect the products. Dick Smith Electronics has responded to that need by launching the new Harmony and Harmony Gold range of connection cables. The range of over 40 cables includes audio, video and optical cables in a variety of lengths, with a vast array of connectors to suit most needs.

The Harmony cables are mid-quality, while

the Harmony Gold range is ultra-high quality for the discerning user. The optical cables are suitable for new technology products such as DVD players, digital video cameras, Mini Disc players

and amplifiers with

Dolby Digital and Dolby Prologic in-built.

Harmony cables range in price from the 2m RCA plug/RCA plug for \$12.95 to the 5m 3xRCA plug/3xRCA plug for \$36.95. Harmony Gold cables range in price from the 2m RCA plug/RCA plug for \$19.95 to the 5m 3xRCA plug/3xRCA plug for \$49.95. Both ranges are available from Dick Smith Electronics stores throughout Australia, or via mail order by calling Dick Smith Electronics Direct Link on 1300 366 644.

1800W sinewave inverter

The PROsine 1800I DC to AC power inverter from Statpower Technologies in Canada supplies true sinewave power that allows loads within the power rating of the inverter to operate to specifications.

Without the harmonic distortion of modified sine wave, true sine wave eliminates interference in audio, video and electronic equipment. Also, true sinewave makes motor-based loads start easier and run cooler and quieter. With a true sinewave inverter, all loads run as they do when connected to ordinary utility power.

The PROsine 1800I inverter also features a user-enabled sleep mode for power conservation. Available options include standard Australian three-pin plug outlets or direct hardwire outlet. Advanced thermal design keeps the unit cool at full loads. New IGBT components offer higher power switching capability at higher operating voltages, which simply means better performance at a lower cost.

At 391mm long x 279 wide x 115mm high, the inverter supplies 1800 watts of continuous output with a five-second surge rating of 2900W; peak output current is 20A. Voltage input is 12V or 24V DC and output is 230V AC RMS. The unit is protected against overload,

short circuit, over temperature, over/under input voltage and AC back-feed. The PROsine 1800I DC to AC power inverter is CE approved.

For more information circle 241 on the reader service card or contact Bainbridge Technologies, 77 Shore Street, Cleveland 4163.

Compact digital colour camera

Now available from Allthings Sales & Services is a digital signal processing Colour CCD Video Surveillance Camera, claimed as ideal for discreet wall or ceiling mounting — yet obvious enough to provide deterrence value and satisfy privacy concerns.

The camera accepts CCTV industry standard C or CS mount lenses and measures 70 x 47 x 42mm (LxWxH), with a weight of 145 grams. Main specifications are horizontal resolution 400+ lines (better than VHS quality), 1/4" CCD sensor with 297,984 active elements, automatic white balance, automatic backlight compensation and automatic 1/50 to 1/100,000 second electronic shutter. The camera is 12V DC powered via a 2.1mm DC socket, with output standard 75Ω composite video via a BNC socket.

Options and accessories include 12 lenses from 2.1mm to 16mm focal length, polarising filters for glare reduction and exposure control, and colour correction filters to compensate for 3600K and 4300K fluorescent lighting. To simplify and minimise installation costs there are two single-cable solutions — a flexible 5mm diameter four-core shielded cable or baluns that allow use of Category-5 LAN or common telephone cable.

The camera is priced from just \$189. For more information circle 242 on the reader service card or contact Allthings Sales & Services, PO Box 25, Westminster 6061.

Pro midrange drivers from JBL

JBL Professional has introduced two midrange transducers which will fill an important gap for custom system designers. The new 2012H and 2020H are 10 and 12-inch 'maximum output' cone transducers designed for direct radiating and horn-loaded applications. Their components incorporate a larger magnetic gap than traditional designs, with a symmetrically placed copper shorting ring that reduces both second and third order distortion characteristics. This provides a flat impedance curve over the entire bandpass of the transducer and results in constant power delivery to the transducer at all frequencies.

JBL has already employed the 2012H in custom midrange horns for the new Venue

Series products, while the 2020H has been used in special custom systems for the European market. Both models have been rigorously road tested by some of JBL's customers who design their own systems, including Canada's Jason Sound who are using 48 of the 2020Hs in a touring rig.

For more information circle 243 on the reader service card or contact Jands Electronics on (02) 9582 0909.

Checks for leaky components

Tracking down elusive shorted or leaky components is now much easier with the improved LeakSeeker 82B. Simply touch LeakSeeker's probe to pads along the trace that you suspect a short or leaky component is; the pad where the beep is highest is the lowest resistance and is therefore the bad component.

Touching pads in one direction and then the other will produce beeps higher or lower in pitch, and also light the LED scale, to show you if you are getting closer or further from the leaky part. LeakSeeker 82B automatically recalibrates itself as you make progress, or you can switch to manual and probe a small dense area, where a bad part only a quarter of an inch away from a good part can be found.

LeakSeeker 82B will locate not only shorted components, but even leaky components that can be as high as 150 ohms. It can even find active shorts that only show up when the unit is turned on!

For more information contact Electronic Design Specialists, 4647 Appalachian Street, Boca Raton, Florida 33428.

DDS synthesizer has 68MHz outputs

The new Novatech Instruments Model DDS7pc, a 68MHz PC ISA bus card, is claimed to bring a new level of performance to plug-in synthesized signal generators.

Contained on an 8-bit ISA bus legacy card, the DDS7pc generates simultaneous AC/MOS/TTL and sine outputs up to 68MHz in 0.04Hz steps under software control. An external clock input allows multiple units to remain phase synchronous and allows customer configured frequency ranges. The sine output is programmable via an on-board step attenuator in 4dB steps to 60dB (1V to 1mV RMS).

Both C-language source and object software are supplied for DOS and Linux with 'out-of-the-box' operation. The supplied software permits switching of the frequency in less than 1ms. Since the source code is supplied, customization to suit your application using the freely available gnu C compiler is straightforward. The DDS7pc is ideal for programmable test stations and other applications requiring multiple and changing frequencies. Use of legacy 8-bit ISA bus permits nearly any PC compatible computer to become a test station based upon the DDS7pc.

For more information contact Novatech Instruments, 17962 Midvale Avenue N., Suite 219, Shoreline, WA 98133-4925. ♦



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Lighting the Way with LED Illuminators

Need a rugged, reliable and very efficient source of either visible or infra-red light? Nowadays it's quite easy to build up your own, using low-cost LED illuminator kits from firms like Allthings Sales & Services — which can also supply matching IR-sensitive video cameras, and even very neat combined camera/illuminator units for surveillance work.

by Jim Rowe

LIGHT-EMITTING DIODES or 'LEDs' have become the standard way of providing status indication on today's electronic equipment. Look at almost any computer, hi-fi amplifier, VCR, CD player, computer, modem or whatever, and you'll generally see one or more LEDs of different colours, glowing away or blinking quietly to show what's happening...

There are a number of reasons why LEDs have completely superseded traditional tungsten-filament incandescent lamps for such applications. One reason is that as solid-state light emitters they're more rugged, with no flimsy and fragile filament to break or 'blow'; another is that they run almost stone cold, because they're much more efficient. That is, they turn much more of the electrical energy input directly into light, and waste very little as heat.

As a bonus, it's easier to produce LEDs with light output of different wavelengths, to produce a variety of useful colours: red, green, yellow, orange and more recently, blue and white. Not only that, but they can also be made to produce output in the 'invisible' infra-red (IR) and near-infra-red areas of the spectrum, opening up new applications again.

Probably the only reason why we haven't seen LEDs used more to replace incandescent lamps in other applications, like room lighting and parking/tail lights on cars, is that individual LEDs tend to have relatively modest light output — at least on a continuous (rather than pulsed) basis. More and more, though, this disadvantage is gradually being overcome by using arrays of multiple LEDs, to produce 'LED illuminators' with surprisingly high output.

If you're a driver, you've probably noticed the compact but very bright red lamps



Two of the assembled LED illuminators, at upper right, plus the LEDs, PCB, housing and connection lead as supplied in a kit.

mounted in the back window of some cars, as an auxiliary brake lamp. These lamps are almost always LED arrays, as are the flashing tail lamps fitted increasingly to pushbikes.

Similar arrays fitted with IR or near-JR LEDs are also being used increasingly to serve as lamps in surveillance situations — taking advantage of the fact that the CCD sensors used in many video cameras are much more sensitive to IR illumination than is the human eye. So a scene can be brightly lit as

far as a CCD video camera is concerned, while still appearing to be in total or near darkness as far as we humans are concerned!

Build them yourself

Happily you can now build up these very efficient LED illuminators for your own applications, very easily and at low cost, by taking advantage of readily available kits. In this article I'm going to show you how easily it can be done, using sample kits sent to us for review

by WA firm Allthings Sales & Services.

Allthings can supply five different illuminator kits based on a round double-sided PCB 48mm in diameter, which can take up to 50 LEDs 5mm in diameter. Along with the PCB is supplied a neat 52mm-diameter housing of moulded black plastic, which protects the assembled lamp and gives it a professional appearance. Each kit also comes with 52 LEDs, sufficient to fully populate the board plus two spares.

The only real difference between the five kits are the actual LEDs supplied, which come in five types — each with peak output in a different part of the spectrum. Four emit in the IR or near-IR range, with wavelengths peaking at 940nm (IR940), 880nm (IR880), 845nm (IR845) or 830nm (IR830); the fifth type is an ultra-bright visible red type with peak output at 660nm.

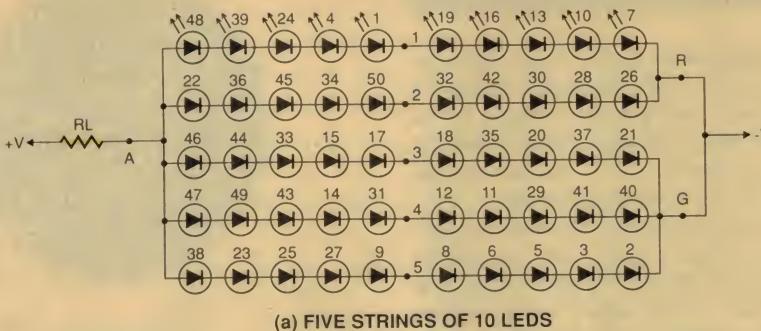
Needless to say, the kits using the IR or near-IR LEDs are mainly intended for surveillance work, or perhaps things like recording the behaviour of nocturnal animals. Only the kit with the bright visible red LEDs is really suitable for use as a normal 'light', for things like an car or bike brake lamp, emergency lighting or darkroom illumination.

For example to the human eye, there's virtually no output at all from the illuminator using the IR940 LEDs, as pretty well all of the output from these LEDs is in the IR range outside the range of our eyes. But to a video camera with a compatible CCD sensor (Allthings stock them, too), a scene illuminated by this illuminator can be very brightly lit.

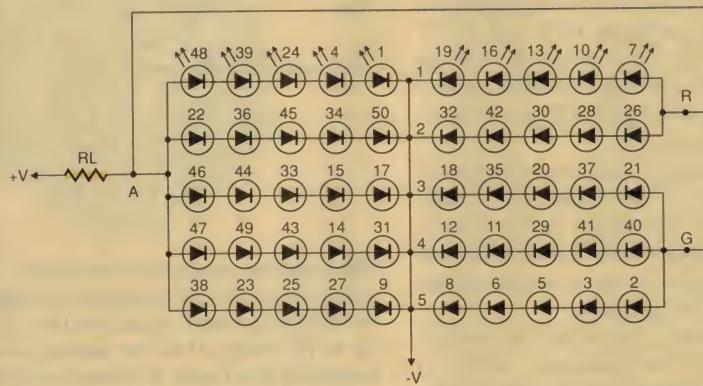
It's much the same with the illuminators using the IR880, IR845 and IR830 LEDs, which in some cases can be more effective with different types of CCD camera sensor. To the human eye the IR880 LEDs appear to emit only a faint red glow, while the IR845 and IR830 types emit what most people describe as just a 'dull red' glow.

By the way a typical monochrome CCD camera sensor has its peak sensitivity at about 540nm, in the middle of the visible light range. Although the response 'tails off' towards the IR end, and may be less than 20% of its peak value by around 800nm, there's generally still quite practical sensitivity even at 940nm.

For situations where there can be significant amounts of visible light present at times, Allthings can supply special 'IR pass filter' discs for the camera lens to ensure that its image isn't 'washed out' or otherwise disrupted. These filter discs are essentially opaque to wavelengths shorter than about 750nm, so they look black to our eyes — but allow the camera to 'see' clearly at near-IR and IR wavelengths. (They also improve lens focussing when there's a combination of IR and visible light, because the focal length of the lens tends to be different at different wavelengths. With the visible light excluded,



(a) FIVE STRINGS OF 10 LEDs



(b) TEN STRINGS OF FIVE LEDs

Fig. 1: The 48mm round PCB supplied in the kits is quite flexible, and can be wired for up to five strings of 10 LEDs in series (a) or up to 10 strings of five in series (b), to suit different supply voltages.

you can focus the IR image more precisely.)

So which of Allthings' five 'round' illuminator kits you choose will depend on what you want to do with the illuminator, and hence the wavelength that's most appropriate.

Incidentally the prices of the kits do vary according to LED wavelength, because the LEDs themselves vary in cost. The kit using the 940nm IR LEDs is only \$19, while those with either the 880nm or ultra-bright visible red LEDs are \$29. Then comes the kit with the 845nm LEDs, at \$39, and finally that with the 830nm LEDs at \$44.

I should note that Allthings can also supply somewhat larger rectangular LED array kits, which take a total of 180 LEDs in an array of 15 rows by 12 columns. These can be supplied with the same choice of LEDs for different wavelengths, but understandably they're somewhat more expensive due to the larger number of LEDs. Prices for these begin at about \$139.

We're going to concentrate here on the more affordable round illuminator kits, which are likely to be fine for most applications.

Kit assembly

The 48mm round PCB used for these kits is double sided, and quite versatile in that it can be used to mount and connect up varying numbers of LEDs (to suit different light out-

put requirements) and also two different wiring configurations (to suit different supply voltage/current requirements). For example you can easily fit either 20, 30 or 50 LEDs, for three different light output levels; you can also wire up the LEDs in series strings of either five or 10, to suit the supply voltage you're using.

The only complication of this versatility is that fitting the LEDs to the board with some of these configurations can be a little tricky, so that you need to exercise care and double-check your work as you proceed.

When you look at the front of the PC board, you find that some 20 of the LED positions are marked with white silk-screened circles. These are actually the LEDs which can be fitted to wire up the illuminator for only 20 LEDs. On the other hand the positions without the circles are those you can use to wire it up for only 30 LEDs. Needless to say if you want to wire it up as a 'fully populated' illuminator with 50 LEDs, you fit them into all positions.

In each case the simplest way of wiring up the board is for the 'strings of 10 in series' configuration, where all of the LEDs are fitted the same way around: with their orientation flat towards the right — looking from the front, with the 'LED1' position uppermost (see Fig.1).

Hands-on Electronics

It's a little more tricky if you choose to wire the LEDs in the alternative 'strings of five in series' configuration, because in this case half the LEDs have to be wired the other way around — i.e., flat towards the left. We'll look at this again shortly.

How do you choose between the two wiring configurations? This is largely determined by the (DC) supply voltage you want to use. You'll need a higher voltage (typically between 14V and 21V, minimum) for the 'strings of 10' configuration, whereas the 'strings of five' configuration needs typically between 6.5V and 10.5V minimum. (The exact minimum voltage levels depend on the type of LED, because the different wavelength LEDs have different forward voltages.)

So if you need to run your illuminator from a nominal 12V DC supply, you'll probably need to use the 'strings of five' configuration. On the other hand if you can use say a supply of say 24V or more, you can use the 'strings of 10' configuration.

Fig.1 shows the circuits for the two different wiring configurations, with (a) showing the 'strings of 10' arrangement and (b) the 'strings of five' setup. Note that in each case all 50 possible LEDs are shown; if you want to fit only 20 you can wire up just the two uppermost rows (connected to terminal R, at the right-hand end), while to fit only 30 you can wire up only the three lowest rows connected to terminal G.

As you can see for the 'strings of 10' configuration in (a), the negative side of the supply is connected to points R and/or G, while the positive side connects to point A — via a suitable current limiting resistor R_L (more about this later).

On the other hand for the 'strings of five' configuration in (b), the negative side of the supply is connected to points 1 - 5 in the centre of each row, and the positive side to points R, G and A. In this case all of the LEDs on the right-hand side of each row are reversed in polarity, compared with their orientation for (a).

Fig.2 shows the actual board wiring for the 'strings of 10' configuration, with the front of the board shown at the top and the back below. Similarly Fig.3 shows the wiring for the 'strings of five' configuration. In each case the various LED positions are numbered to correspond to Fig.1, as are the various connection points on the board. Both diagrams also show all 50 LEDs fitted, but you can easily leave out those in some rows if you want lower light output.

To help avoid confusion, the LEDs which need to be 'reversed' for the 'strings of five' configuration are shown in red in Fig.3.

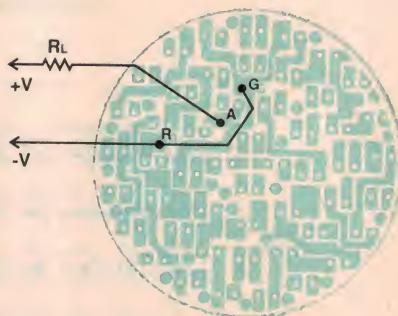
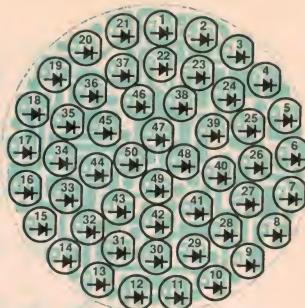


Fig.2 (above) shows how the PCB is wired for up to five strings of 10 in series, while **Fig.3 (below)** shows the wiring for up to 10 strings of five in series. In both cases the front view is shown above the rear (wiring) view.

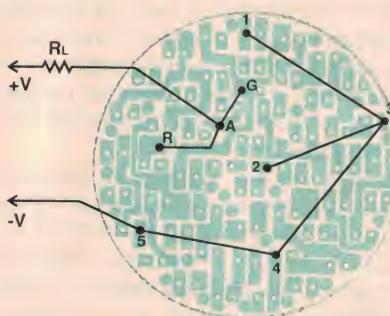
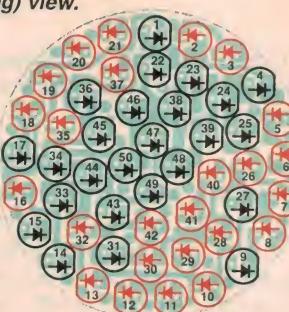


Table 1: LED voltage drops*

Wave Length	Forward drop	String of 5	String of 10
660nm	2.0V	10.0V	20.0V
830nm	1.4V	7.0V	14.0V
845nm	2.1V	10.5V	21.0V
880nm	1.4V	7.0V	14.0V
940nm	1.3V	6.5V	13.0V

*Typical, at maximum forward current

Current limiting

As LEDs tend to have a relatively constant forward voltage drop, they need external current limiting to ensure that they don't exceed their safe current and power dissipation ratings. The simplest way to do this in most cases is by using a series resistor, as shown in Figs 1, 2 and 3.

The value of this resistor needs to be worked out, because it varies according to the type of LED you're using, the number of LEDs and their wiring configuration, and of course the actual supply voltage. Here's a rundown on how you work out the correct resistor value, and also its power rating.

First of all, we need to work out the voltage drop for the type of LED we're using, and multiply this by the number in each series string for the configuration. Table 1 is designed to make this easier, by showing both the forward drop for each type of LED and the corresponding drops for either five or 10 in series.

By looking up Table 1, then, you can find the voltage drop for the LEDs and configuration you're using. For example a set of 660nm red LEDs wired in 'strings of 10 in series' will drop 20V, while a set of 940nm IR LEDs wired in 'strings of five in series' will only drop 6.5V. (Note that this voltage drop will *not* vary whether you're using 20, 30 or the full 50 LEDs — this will only change the current drain.)

Now you need to work out the total current drain, which depends on both the type of LED you're using (they have different maximum ratings) and the wiring configuration. Needless to say the more strings you have in parallel, the higher the current drain.

Here again we have a table to help us. Table 2 shows the maximum forward current for each type of LED, and the total current for the two main configurations: five strings (of 10 LEDs in series), and 10 strings (of five LEDs in series). Note that this covers only the two main configurations, of 50 LEDs; if you want to wire up a smaller array, you'll need to work out how many strings you *are* using and multiply the single-LED current by this figure to get your own total.

There's a further complication, at this point: the maximum current levels shown in Table 2 are rated figures, and don't take heating into account. Even LEDs do dissipate

Table 2: Maximum currents

LED Wavelength/Current	Five Strings	Ten Strings
660nm/30mA	150mA	300mA
830nm/50mA	250mA	500mA
845nm/100mA	500mA	1.0A
880nm/100mA	500mA	1.0A
940nm/100mA	500mA	1.0A

some of the incoming electrical energy as heat, and if you're fully populating the board with all 50 LEDs this means that they can get fairly hot in continuous operation at full rated current. Unless you're able to keep them cool with a small 'muffin' fan or similar, you may need to reduce the current level to say 75% of the maximum figures shown in Table 2.

So by now you should have both the voltage drop of your LED array, and the total current it should draw. This is all you need, to be able to work out the value of series dropping resistor R_L , knowing the supply voltage you want to use. It's basically just a matter of using Ohm's law:

$$R_L = (V_s - V_a)/I_a$$

where V_s is the supply voltage, V_a is the voltage drop of your LED array and I_a is the total current.

Now because the resistor will often be dropping a few volts, while passing significant current, it too will tend to get hot. So we also need to work out the resistor's power dissipation, so we can use one with the correct power rating. Here's the formula for this:

$$P_r = (V_s - V_a) \times I_a$$

where the symbols on the right-hand side are exactly the same as before. We just multiply the voltage drop by the current this time, rather than dividing. The idea is to choose a resistor with a power rating comfortably above the figure you calculate from this expression. A couple of examples will hopefully make all this clear. Let's say we're planning to use 50 of the 880nm LEDs, wired up in 'strings of five' (as per Fig.1(b) and Fig.3). So from Table 1 the voltage drop V_a will be 7.0V, and since there will be 10 strings, the maximum current level I_a from Table 2 would be 1A. Let's say we decide to reduce this to 750mA, to keep the illuminator from getting too hot in continuous operation.

Now if we want to operate this illuminator from a 12V supply, we'll need a dropping resistor with a value of $(12 - 7.0)/0.75$, or 6.6Ω . (You'd select the nearest preferred value — say 6.8Ω .) And it would have to have a power rating of $(12 - 7.0) \times 0.75$ or $3.75W$, so you'd need to use at least a 5W component.

As a second example, let's take the case of an array of 50 LEDs again, but this time we'll use the 660nm ultra-bright visible red LEDs. We'll also connect them in strings of 10 (as per Fig.1(a) and Fig.2), with the idea of connecting them to a 24V DC supply.

From Table 1, we see that the voltage drop V_a will be 20V; and from Table 2, the current drain I_a will be 150mA (five strings of 10). So our dropping resistor value this time will be $(24 - 20)/0.15$, or 26.6Ω . You'd use the nearest preferred value of 27Ω , of course, and as it would be dissipating $(24 - 20) \times 0.15$ or $0.6W$, you could probably use a resistor with 1W power rating (or ideally 2W).



Allthings Sales & Services can also supply a kit for this Cam-Illum unit, which combines an 845nm IR illuminator with a CCD camera module in an 'IR sensor' case.

That's the basic idea, then. As you can see it's fairly easy to use the Allthings illuminator kits to make up LED illuminators with five different wavelengths in the visible, near-IR and IR sections of the spectrum, for different uses. You can also use the kits to produce illuminators with a range of light output levels (determined by the number of LEDs), and to suit different DC supply voltages. It's all quite flexible.

Using the sample kits supplied by Allthings, we were able to try out a number of these possibilities and see how effective the illuminators can be when used with one of their low-cost monochrome CCD video cameras (a Sony chipset camera, the CAM-BW 3711, available for \$132). We were particularly impressed with the effectiveness of the 50-LED 940nm illuminator, which can provide excellent illumination of a typical small room as far as the camera is concerned — yet leave the room in virtually total darkness as viewed by the human eye!

Needless to say the kit using the 660nm ultra-bright red LEDs also gave very impressive results, achieving a dazzlingly bright red output that should be very suitable for use as an auxiliary brake light or emergency lighting source.

Combo unit

Before closing, I should mention that Allthings are now also able to supply a combination unit, the 'Cam-Illum kit'. This combines a round illuminator PCB and 50 of the 845nm LEDs (connected in 10 strings of five in series), with a Sony chipset 1/3" CCD cam-

era module using a 12mm board-mounted lens, all of which fit inside a plastic case of the wall-mounting type used for passive IR security sensors. The whole thing therefore makes an excellent and unobtrusive camera/illuminator combination for surveillance work.

With this unit the illuminator module is mounted behind the moulded Fresnel lens, in roughly the same position you'd normally expect to find the PIR sensor. This allows the Fresnel lens to act as a diffuser for the LED array, giving good illumination of the scene viewed by the camera. The camera's lens simply protrudes through the centre of the case, in the position often occupied by a status LED bezel. (If you wish, there's an optional lens and a front-fitting IR filter to make it even harder to identify. This also has a focal length of 6mm, giving roughly double the angle of view.)

The whole thing runs from 12V DC, and draws about 470mA. As the basic kit sells for only \$179, it therefore makes a very neat and cost-effective solution for home or office surveillance work.

To go with the Cam-Illum kit, Allthings can also provide a regulated 12V/700mA plug-pack power supply for \$25, and a plug-in cable set for \$5. The alternative 6mm f/1.7 board lens costs \$20, while the 14mm-diameter front-fitting IR filter is a further \$10.

For more information on all of the cameras, illuminator kits and other interesting items stocked by Allthings Sales & Services, I suggest that you check their website at www.allthings.com.au. Alternatively you can write to them at PO Box 25, Westminster 6061, or phone on (08) 9349 9413. ♦



Silicon Valley Newsletter.....

Four 'biggies' invest in Red Hat...

BETTING THAT Red Hat Software could grow into the biggest competitive challenge to Microsoft's dominance of the PC desktop, IBM, Compaq, Novell and Oracle have put their financial might behind the North Carolina start-up with undisclosed investments in the privately-held firm. Netscape and Intel invested in Red Hat last year.

Red Hat has a 60%+ share of the market for packaged Linux operating systems software. Others, including Caldera, SuSE and Pacific HiTech divide much of the rest of the market.

Packaged Linux software, which sells for an average of around \$50, has become popular in the corporate market, where support and service is a key requirement. Most individual computer users, meanwhile, are continuing to download millions of copies of Linux from various Web sites where the software is available at no cost.

The investments by such a cadre of powerful high-tech industry leaders is likely to further propel Red Hat into the market leadership position. "Red Hat will become the premier flavour of Linux. This puts Caldera in a bad position of becoming a second-tier version of Linux", said Jon Otsik of market research firm Forrester Research.

The latest move by IBM and others come on the heels of the announcement by IBM and Computer Associates to support Red Hat's Linux. IBM also will support the other three Linux products, but the momentum is clearly behind Red Hat.

Dell to buy US\$16B worth of IBM hard drives

IBM USED TO MAKE or break the financial future of PC disk drive suppliers with large, multi-year delivery contracts. However in March it was Dell Computer that secured the future of IBM's PC disk drive business, with a massive US\$16 billion

seven-year deal that will propel IBM's PC drive business into the same orbit as Seagate Technology and Quantum.

Ironically, IBM and Dell are two fierce rivals in the personal computer market. Yet, as part of the massive deal, the two companies agreed to jointly develop new technology and give each other advance looks at each other's future products.

Analysts agreed the deal will bring stability in Dell's relationship with at least one key components supplier, and also improves the company's chances of gaining access to new technology ahead of its competitors. Dell will also benefit from significant discounts that IBM is likely to have provided in return for a contract of this magnitude.

IBM, meanwhile, will benefit by leveraging the Dell deal to secure other large supply contracts with major PC vendors. As its disk drive production ramps up, IBM's own PC division will benefit from access to state-of-the-art disk drives the company will be able to procure at manufacturing cost.



Keynote speaker at the LinuxWorld Expo 99 in San Jose was Linux developer Linus Torvalds (left), shown with one of his daughters. Mr Torvalds was a big hit. Also at the show was Robert Young, founder and CEO of leading Linux distributor Red Hat Software, in which IBM, Compaq and others have just invested...

Intel pays US\$2.2B for Level One

INTEL HAS AGREED to pay US\$2.2 billion for Level One of Sacramento, a chipmaker that specializes in high-speed ICs that carry voice, data and video over computer networks and over the Internet. Intel said it intends to operate Level One within a newly created division.

"Level One will provide us with the silicon building blocks necessary to supply the rapidly growing demands created by the Internet and e-commerce", commented Intel CEO Craig Barrett.

Level One's 800 workers will become employees of Intel, which already has major production facilities in the Sacramento area. Level One president and CEO Robert Pepper will become Intel's new VP for the Network Communications Group. He will also remain general manager of the Level One Components Division.

The acquisition is the largest in Intel's 31-year history. A large acquisition had been expected, but most analysts had been looking for the company to purchase a major player in the networking equipment market.

First major Linux show is a real hit

SOME 12,000 DEVELOPERS, MIS managers and Linux enthusiasts turned out for LinuxWorld Expo 99 in San Jose, the first major event in the fast developing market for Linux-based hardware, software and peripheral products. It was by all accounts the 'coming-out' party for the operating system that appears set to give Microsoft and its family of server products a run for their money.

With some 10 million users worldwide, Linux has quickly become the darling of computer network administrators. The software provides a level of network reliability and configuration flexibility unmatched by Windows NT. Linux networks typically stay up virtually unattended for months on end, sometimes years. And the software is now available for virtually any hardware platform, including Intel, Sparc, and Alpha.

"The number of platforms has gone from just Intel to where I can't remember", Linux developer Linus Torvalds told a crowd of 7500 during his keynote address, as one of his infant daughters scampered around in front of the stage where he spoke.

Linux is free for those who want to download it from any number of Web sites. Others pay a small fee to companies such as Red Hat Software, Caldera and Pacific HiTech who offer well-supported, stable versions of Linux. Comparable Microsoft products, such as BackOffice cost several thousand dollars. And Linux is now supported on virtually any hardware platform, and for system configurations ranging from a single workstation to cluster web servers. Torvalds said support for supercomputers is in the works.

Torvalds, who said he doesn't think of himself as an industry visionary, was treated like a rock star at his keynote address, as fans wearing 'Linus-for-President' T-shirts (dotted with the Linux logo penguin buttons) swarmed around him after the speech trying to shake his hand or get his autograph.

"Many people think of Linux as a new phenomenon", said Torvalds, "but it's not to me. I've been working on it for eight years" he added, referring to his time as a student at the University of Helsinki, where he constructed the first part of the Linux kernel code. In a radical move, Torvalds subsequently posted the kernel on the Internet for anyone to download, use or improve.

So far, much to the chagrin of both Microsoft and other Unix operating system vendors, Linux is spreading through the network administrator and technical computing community like wildfire. The use of Linux has grown by a factor 10 in each of the last six years.

"It's no longer a small Unix, it's up there with the big boys and the big boys are nervous", he said — adding a stern warning, "And they should be!"

The developments surrounding Linux in the past several months have been 'stunning', Torvalds said. "A year ago, I used to speak to groups of 15 people. Now there are 8000 of you." Those developments include a rash of Linux product and support announcements by almost all major players including Compaq, IBM, Dell and Hewlett-Packard.

HP to shed its original business

SIXTY-ONE YEARS after it got its start in a Palo Alto garage, and in a move that might well have founder David Packard turning in his grave, Hewlett-Packard announced plans to split off its electronic test-and-measurement and medical equipment business from the computer and peripherals side. A public stock offering for the new company, whose product lines formed the foundation on which HP was built, is planned for this fall.

As part of the radical restructuring, company CEO Lewis Platt will resign in mid-2000 when the transformation has been completed. Platt will stay on as chairman.

The move represents a huge bet by the company that the two entities will be able to perform better separately than combined, and that as result, the combined market value of their respective shares, will be greater than the current single stock.

For most of the past 10 years, HP has struggled to combine the fast-paced, fast growing computer and peripheral products group with the more static equipment product lines that helped HP establish the company and its reputation. Until the mid-1980s, the electronics side was HP's main source of revenues. Today the group's US\$7.6 billion in sales represents just 15% of the company's overall revenue. ♦

New laser handles 500k calls/wavelength

LCENT TECHNOLOGIES has developed a new laser capable of transmitting up to 40 gigabits of data per second over a single wavelength on a single optical fibre — four times the current fastest laser. That transmission capacity means the laser could transmit up to 500,000 simultaneous phone calls over a single wavelength.

MCI-WorldCom will start testing the so-called 'WaveStar 40G Express' laser for use in its fibre-optic telecommunications network. The WaveStar laser uses a so-called time-division-multiplexing technique, in which the light pulses on and off, transmitting data along a laser beam in a fibre-optic strand.

VLSI rebuffs takeover bid from Philips

LONG-TIME SILICON Valley chipmaker VLSI Technology of San Jose has received a US\$777 million buyout bid from Royal Philips Electronics of the Netherlands, which is Europe's largest IC producer with US\$3.3 billion in IC sales. The bid corresponds to US\$17 per share, a 60% premium over the pre-offer market price.

If the bid were successful, it would be the largest acquisition of a US semiconductor firm by Philips since it acquired Signetics of Sunnyvale in the early 1980s. However it seems that the VLSI board does not welcome the bid, and has instituted a 'poison pill' defence strategy.

Philips asked VLSI's board for a decision no later than March 3, but VLSI said it had scheduled a March 23 board meeting to discuss the Philips offer. Philips said that was simply not acceptable. "Given the compelling nature of the offer and Philips' desire to quickly complete such a mutually beneficial transaction, Philips has decided to take its offer directly to VLSI shareholders", the company said in a press statement.

Philips is also demanding that VLSI's board removes the company's poison pill anti-take-over defence, which could make it prohibitively expensive for Philips to acquire the company. If the board refuses, Philips threatened to get rid of the board after the company gains a majority position when enough shareholders have accepted the tender offer.

VLSI officials refused to comment on whether the company will accept the Philips offer.

Computer

News & New Products

A3W colour laser

Epson has announced a new A3W colour laser printer, the EPSON ColorPage EPL-C8000, claimed ideal for business customers and specialist corporate divisions, such as marketing departments. The EPL-C8000 lets



customers quickly produce high-quality prints at up to 16ppm for black-and-white, and 4ppm for colour A4 prints.

AcuLaser Colour Halftoning technology lets the printer operate in two modes. It can produce high-quality, full-colour images for business documents with graphical images or continuous tone images, such as photographs. This means the printer is versatile enough to produce brighter, more detailed colour images.

The colour laser controller is a 133MHz 64-bit RISC processor and the printer comes standard with 64MB of SDRAM, expandable to 256MB. It also has a dedicated Application Specific Integrated Circuit (ASIC) for the control of halftoning and colour management.

The EPL-C8000 is designed with business customers in mind. It has a user-friendly printer driver with an on-screen status monitor that lets customers easily control its advanced features. The printer is also network-ready and comes standard with built-in 100BaseTX ethernet card.

For more information circle 161 on the reader service card or contact Epson Australia on (02) 9903 9000.

'World's fastest PCI, Compact PCI/PXI digitizers'

Acqiris has released a new range of high-speed waveform digitizer products for use in computer-based data acquisition systems. The new digitizers include the Models DP105, DP110 and DC110. The DP series products are PCI compliant and plug directly into a PC bus to turn the computer into a high performance digital oscilloscope, while the DC110 is a 3U CompactPCI/PXI module for use in modular data acquisition systems.

Top of the line performance is achieved with the DC110 and DP110 cards, which feature high-speed (1GS/s) digitizers with wide bandwidth (250MHz) front ends and long acquisition memories (up to 2M points). The DP105 is a lower cost alternative with 500MS/s sampling, 150MHz bandwidth and up to 1M points of memory.

The digitizers all deliver oscilloscope-like



performance with input voltage ranges from 50mV to 5V full scale, 50Ω and 1MΩ coupling, variable offset, full input protection and flexible triggering. A sequential trigger mode that re-arms with less than 500ns of dead time is standard and makes the capture of high repetition rate, burst, or impulse-response type signals easy. Waveforms can be recorded as they arrive complete with trigger timing information.

Large-scale monolithic integrated circuits have been extensively used to reduce the cards to a mere 106 x 175mm area, with a power consumption of just 15W.

Acqiris digitizer cards are supported by AcqirisLive, a digitizer control program for

Windows 95/98/NT, and they also work with 'off-the-shelf' software packages such as National Instruments' LabWindows/CVI and LabVIEW. The digitizers are fully programmable and are capable of transferring data to a PC at rates up to 100MB/s over the PCI bus.

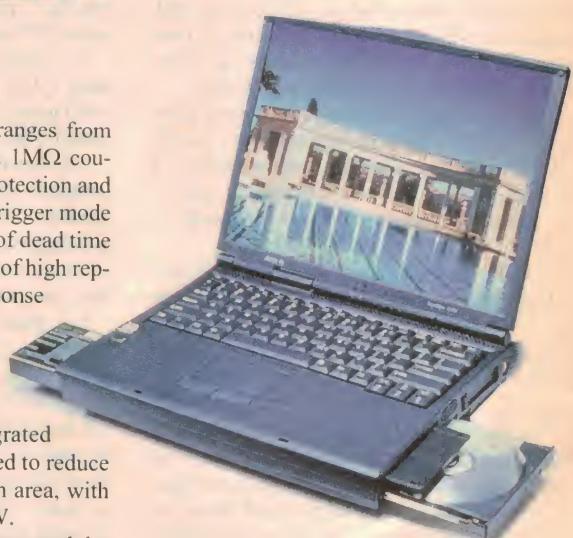
Prices range from \$6600 for the DP105 single channel 500MS/s 150MHz 128k point digitiser to \$9900 for the DC110 single channel 1GS/s 250MHz 128k point digitizer, with expanded memory options available.

For more information circle 162 on the reader service card or contact Acqiris, PO Box 317, Blackburn 3130.

New notebooks from Acer

Acer Computer Australia has introduced a new series of notebook PCs, the TravelMate 720 series, designed to penetrate the high-end corporate market. According to Antonio Leone, Acer's Product Manager for Portable PCs, "this new series delivers all the benefits of a full-featured corporate desktop PC — processing power, network connectivity, and multimedia. It also has a built-in fax-modem, which is a standard feature on all Acer notebook PCs."

Features of the TravelMate 720 series include a 14.1" active matrix (TFT) XGA resolution LCD with dual view feature, 256-bit AGP 1x enhanced graphics accelerator, Pentium II processor (366/333/300MHz), PCI-based audio system and lithium-ion graphite battery technology for extended



battery capacity and working life. The AcerMedia bay allows effortless swapping of the modular CD-ROM drive with optional DVD or LS-120 drives, or an additional HDD.

The TravelMate 720 series is priced from \$6999 (RRP inc tax). For more information contact Acer Computer Australia, Tower A, Level 3, 112-118 Talavera Road, North Ryde 2113.

1200dpi A4 laser prints at 16ppm

Epson's new EPL-N1600 A4 laser printer prints at 16 pages per minute with 1200dpi-class print quality, and is claimed as ideal for workgroups and stand-alone connectivity.

The printer has a high speed 150MHz RISC processor for fast data transfer and multi-page printing. It also features standard 8MB memory that can be expanded to 40MB. This ensures computer networks won't become congested while waiting to print. Bi-Resolution Improvement Technology (BIRITech) and MicroGray 1200 technology provide detail and sharpness and enhance halftone clarity to guarantee high-quality final output.

The EPL-N1600 has two plug-in Ethernet cards. One offers 10Base2/10BaseT connectivity and the other 100BaseTX. Support is provided for most networks including



Novell, Windows NT, Unix and Apple networks.

The EPL-NL 600 is available now for \$2199 inc tax. For more information circle 160 on the reader service card or contact Epson Australia on (02) 9903 9000.

Effects rendering & video editing board

The Canopus Rex F/X for Windows 95/98 and Windows NT is a high performance AGP or PCI based effects engine providing high quality 3D transitions and environmental effects with fast rendering times. It also doubles as a network video editing board for remote machines lacking a hardware codec and can be used with other video capture devices like the DVReX-M1, miroVIDEO DC30 Plus, miroVIDEO DV300 or the DVRAaptor.

Rex F/X provides the video professional with a near real-time, high performance hardware alternative to more expensive real-time DV editing systems. It's a powerful 128 bit, 16MB graphics card that supports video overlay in high resolutions of up to 1600 x 1200 at 32-bit true color.

Rex F/X includes a set of dazzling 3D effects, such as tumble, spin, fly, explosion, flips, doors and environment effects including haze and lighting. All 3D effects are cus-



tomizable using key-frames and other control settings, with rendering times near real-time. On a Pentium II/400MHz system, Canopus has recorded rendering a one-second 'tumble with haze' transition in 5.5 seconds.

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Compatible with popular non-linear editing software and codecs, Rex F/X plugs into RexEdit 2.0, the newest version of Canopus' powerful video and audio capture and editing software included with the company's DVREX-M1 non-linear editing solution.

Canopus Rex F/X is available for an RRP of \$1299 in either the AGP or PCI version. Additional effects modules are sold separately and may vary in price.

For more information circle 164 on the reader service card or contact Lako Vision, Suite 2, 3 Wellington Street, Kew 3101.

Network & computer service trainer

The Graymark division of Lab-Volt has released the new version of the Commander PC Troubleshooting and Repair Trainer, and the complementary NETtech Network Technology Training System.

The Commander is a complete system for students wanting a career in computer service and repair, providing training from complete novice to technician with an impressive inventory of high-level, hands-on skills. It is supplied with all courseware, and provides thorough knowledge of PC computer systems and each system component; comprehensive understanding of computer technology and concepts; ability to assemble and test state-of-the-art computer hardware; and a thorough understanding of DOS and Windows software installation, and application programs.

NETtech provides complete training for students wanting to become Network Support Technicians. Seventy-five lab exercises help students to quickly and effectively become knowledgeable and skilled in the

essentials of data communications and networks. The course has three major divisions: Data Communication, Peer-to-Peer Networks and Client/Server Networks. Tasks performed by the student include configuring and installing a fax/modem, installing and configuring communication software and communicating with BBS's and web sites.

Both systems are complete with student and instructor guides and reference texts.

For more information circle 165 on the reader service card or contact Lab-Volt, PO Box 289, Ingleburn NSW 1890.

7kV isolated short haul modem

Dataforth Corporation's new high performance DCP485 Limited Distance Modem/RS-232/RS-485 Converter offers a novel combination of protection, speed, and versatility for DIN-rail mount industrial data communications applications. The device allows computers, controllers, terminals, and other industrial I/O devices with RS-232 and/or RS-485 ports to communicate with each other over extended distances while protecting valuable equipment and signals from damage or degradation due to ground loops, power surges, lightning strikes, and other electrical hazards commonly found in industrial environments.

The DCP485 uses heavy-duty optical couplers and a transformer isolated DC-DC converter to provide electrical isolation — 7000V DC surge (1 minute), 1500V RMS continuous — significantly higher than similar modems available from other suppliers. For added safety, ANSI/IEEE C37.90.1-1989 surge protection is also provided on all RS-232 and RS-485



inputs and outputs and on the DC input.

The DCP485 is designed for full duplex operation over two-wire pairs, and may also be operated in asynchronous two-wire half-duplex or two-wire simplex modes. Tri-state outputs permit multidropping of up to 32 data I/O devices. It is relatively fast for industrial applications, with a range of 0-115.2kb/s over distances up to seven miles. At 38.4kb/s the operating distance is one mile (1.6km).

For more information circle 166 on the reader service card or contact Kenelec, 23-25 Redlands Drive, Mitcham 3132.

RS232 sync/async fibre optic modem



The OSD136 synchronous/asynchronous RS232 fibre optic modem provides full duplex RS232 communication over distances of up to 5km of commonly available multimode optical fibre. Its characteristics of handling clock, data signals and two handshake lines, all operating at rates of up to 20kb/s, come from its single chip multiplexer. Whilst the unit is normally used as an RS232 modem, this chip also makes it possible to be used as a four channel multiplexer.

The modem can be set up by the user for asynchronous communications for data rates to 20kb/s. In synchronous mode it is operated with an external clock. The modem is suitable for situations where distance, electrical noise or security considerations render conventional twisted pair links impractical.

For more information circle 167 on the reader service card or contact Optical Systems Design, PO Box 891, Mona Vale 2103. ♦

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Web watch

by Graham Cattley

HAVE reader Collin Burchall to thank for suggesting The MiniDisc Community Page at <http://www.minidisc.org>. It contains just about everything you would want to know about MiniDiscs, as well as FAQs, reviews of MiniDisc players and info on labels and cases. The MiniDisc hacking page is of interest, as it details methods of creating virtual MiniDisc tracks, repairing bad TOCs, how to disable SCMS on some players, and how to record over 80 minutes on a single disk.

It's really quite a comprehensive and technical site, and one that will be of great interest to anyone who uses or works with MiniDiscs.

I KNOW THAT I've mentioned Questlink's EE Design Center before, but it really is a useful and informative site. I used it just the other day to look up some RAM chips, and it was the only site that had them listed. If you are interested in anything from application notes through to parts availability and EDA tools, add <http://www.questlink.com> to your bookmarks.

CATBIRD'S NEST is an interesting site, run by an interesting man. Fred Stewart has compiled his Library of Practical Electronics at <http://people.ne.mediaone.net/fstewart>, and it comprises around 2500 articles, letters, comments and notes from the sci.electronics newsgroups.



Everything is categorised into a dozen or so main pages, with each of these covering a couple hundred items. While it is a computer-generated list (Fred seems to be a very active and competent Perl programmer), don't for a moment think that the content is going to be boring. Fred has obviously selected only the useful and practical messages, and the resulting library is a veritable gold mine. Everything from removing potting compound through to etching quartz crystals, diode current clamps circuits to loudspeaker testing — it's all here.

The whole site doesn't contain a single image, which makes it one of the fastest,



snappiest sites I've come across. Check out <http://people.ne.mediaone.net/fstewart/index.html>, I guarantee you'll find something of interest.

IF YOU HAVE A MIDI instrument and a sound card in your PC, then John Loadsman's home page at <http://www.usyd.edu.au/anaes/rpa/Loadsman.html> will be of interest. On his MIDI interface page he covers the design and construction of a Port-Powered MIDI Interface for both Macs and PCs, with stripboard layouts and circuit diagrams.

John is a specialist in anaesthetics and has a strong interest in electronics, and so it's no surprise to find that he also presents details of FM transmitters for stethoscopes. While you are there, check out John's Excellent Elephant Anaesthesia Adventure at Taronga Zoo. It's not very electronic, but interesting none the less.



SOME TIME AGO I mentioned the SimmStick, a small Australian produced microcontroller development system which looks for all the world like a SIMM memory module. SimmSticks are gaining popularity and in an effort to help SimmStick users, <http://www.simmstick.com> offers a number of SimmStick resources, including a list server and direct links to SimmStick suppliers around the world. As well, you can register for the SimmStick Design Contest99, which offers prizes of up to US\$500, as well as SimmStick boards, regional prizes etc. If you're into uPs, check it out.

EVEN IF YOU ARE just a casual reader of EA, you'll no doubt know of Oatley Electronics. Oatley is one of the few companies around where you can purchase surplus hi-tech equipment at bargain basement prices. Their site (<http://www.oatleyelectronics.com>) is the home of the Oatley Electronics Summer 1999 catalogue, and it is backed with many wondrous items that you'd be hard pressed to find anywhere else, particularly at hobbyist prices.

As you may have guessed from their ads, Oatley offer a range of exotic kits and surplus items, including gas and solid state lasers, night vision equipment and stepper motors, as well as non-electronic items like optical lenses, mirrors and prisms. They're all listed here, along with quite reasonable photos of the products, so you can see what you are getting. As well as an electronics link list, the site offers free classified advertising and a bargain corner where you'll find just the thing you're looking for - believe me! ♦

EA Directory of Suppliers

Which of our many advertisers are most likely to be able to sell you that special component, instrument, kit or tool? It's not always easy to decide, because they can't advertise all of their product lines each month. Also, some are wholesalers and don't sell to the public. The table below is published as a special service to EA readers, as a guide to the main products sold by our retail advertisers. For address information see the advertisements in this or other recent issues.

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Basic Electronics

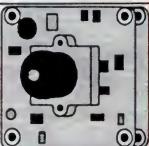
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10 for \$2 or 100 for \$12

VOLTAGE REGULATORS (7812) 70c Ea. or 10 for \$5

USED 27C256-2 EPROMS

\$1.20 Ea. or 10 for \$8

QUALITY DYNAMIC MIC INSERTS

SHURE brand MC125 \$2 Ea. - 4 for \$10

CURRENT MODEL

YAMAHA LINEAR ROBOTIC ARMS AT 5% OF THEIR ORIGINAL COST
, X-RAY MACHINES, HEART MONITORS, SATELLITE TV, TEST EQUIPMENT

These are some of the items that may still be for sale at our Web Site. See our BARGAIN CORNER, TRADERS CORNER & FREE ADS
 FREE ADS should be E-mailed with "FREE ADS" in the subject window

KITS OF THE MONTH

COMPLETE INTELLIGENT BATTERY / POWER MANAGEMENT SYSTEM FOR THE HOME OR CAR COMING SOON

New Battery Monitor Kit: 12v / 24v monitor with low voltage cut-out, audible alarm before cutout. Minimal power uses, power saving 12 led bargraph indicator. Kit inc PCB, all onboard parts, label, 10A cut-out MOSFET + suitable surplus case. for \$32.. For 50A MOSFET add \$3.

SWITCHING REGULATOR KIT: Designed to work with the above system charges battery to 13.4V / 26.8V and turn off @ 13.8V / 27.6V. Kit includes PCB + all on-board parts inc. a 50A MOSFET (space on PCB for more MOSFETS) Switching regulator \$18.



12V LIGHTING SPECIAL Ideal for weekenders camping or caravan, emergency lighting or a portable lantern

NEW DESIGN H.P. CFL INVERTER KIT

The new improved Very Efficient design uses a larger transformer & a SG3525 switch mode Chip. Can drive up to 11 X 10w CFL's from 12vdc. Kitinc. 1 inverter & 1 CFL: \$30

BATTERY: 12V / AHR, 150 X 65 X 93 mm

TRICKLE CHARGER: To trickle charge SLA batteries

Inverter kit with
 1 CFL \$22
 Battery \$25
 Trickle Charger \$6
 One of each \$58
 Extra CFLs \$12



KIT MADNESS SPECIALS.....20A DC MOTOR SPEED CONTROL Very efficient design uses Switch Mode Chip \$15 See our web site for motors..

FM TRANSMITTER MKII with unidirectional mic \$15... **1 CHANNEL UHF REMOTE CONTROL KIT:** with pre-built "Key-Fob" transmitter \$35... **2 CHANNEL UHF REMOTE CONTROL KIT:** with pre-built "Key-Fob" transmitter \$45... **.8 CHANNEL IR REMOTE CONTROL KIT:** with case and logic level outputs \$30... **LOGIC PROBE:** with case only \$8... **INFRA RED TESTER:** with case \$7 **STROBE KIT:** with disposable camera for flash: \$6... **ULTRA VIOLET MONEY TESTER:** Pocket sized unit to detect special UV printing on Australian and some over seas money: \$6

CLOCK WITH CALENDAR AND TIMER

12V DC 12Hr. clock for automotive / domestic/ timer use, large (13mm) Green LED display, AM-PM indicator, Date, Month, 24Hr. Alarm, 59 Min., sleep timer, back up batt. Xtal controlled 50Hz (20ms) clock can also be used for CRO calibration & inverters. Can switch external load during Alarm/timer, 0.5A load directly, or 10A with extra MOSFET, Alarm piezo speaker provided.

PCB & all parts kit, Suitable surplus used box, swivel mount: \$14, 12A mosfet: \$4, Small Piezo speaker to suit \$1 extra, Data sheet for LSI IC (MM5382): \$0.80



PELTIER CONTROLLER: This kit is a sw-mode design & correctly controls temp. of peltiers to 10A (very efficient design) PCB + onboard parts + new surplus case. \$15

FOG MACHINES..... JUST ARRIVED

Professional quality fog machines. This unit would be the perfect partner to our laser light shows, Ideal for discos, parties, fashion parades etc. A special price of \$199



PELTIER EFFECT DEVICES

Make a solid state food cooler / warmer for the car etc. with 2 heatsinks, a fan and one of the following. Could be used for cooling overclocked PC CPUs. All 40 X 40mm.

4A ΔT 65deg. Qmax 42W \$25

6A ΔT 65deg. Qmax 60W \$27.50

8A ΔT 65deg. Qmax 75W \$30

Device comes with instructions to build cooler / heater plus data. Some used surplus heatsinks avail.



*****SPECIAL*****

PERSONAL POCKET ORGANISER
 Stores Phone Nos. etc. plus Memos, Calculator, Clock SPECIAL PRICE \$8



HAVE YOU MASTERED PIC PROGRAMMING?...TRY OUR PROFESSIONAL PIC MICRO PROGRAMMER KIT.

Programs up to 39 Different 8, 18, 28, and 40 pin types of PIC chip. Quick Easy construction and uses serial programing method via your PC's parallel port and uses BOJAN DOBAJ's software that works under Dos, Win3 & 95. Kit inc PCB

plus all on-board parts but no PIC chip Just: \$25... 16F84 PIC chips \$12

KEY-CHAIN LASER POINTER
 650Nm High quality machined metal housing

LASER MODULE
 650Nm as used in the above pointer. (Lm2) \$14

NSW new laws may apply soon

SHOP MINDER/IR FENCE

IR transmitter & receiver kits (two separate PCB's), basic range is up to 20M but can be greatly increased by adding a lens. Output to drive piezo buzzers or relays etc.

2 PCB's + all on-board parts: \$17. 2 suitable boxes + 2 swivel mounts: \$6, Buzzer: \$3, 12A relay: \$3 (fits on PCB) Lens: \$0.80

NEW SUPER LOW PRICE + LASER AUTOMATIC LASER LIGHT SHOW KIT: MKIII. Automatically changes every 5 - 60 secs. Countless great displays from single to multiple flowers, collapsing circles, rotating single and multiple ellipses, stars, etc. Easy mirror alignment with "Allen Key". Kit inc. PCB, all on board components, three small DC motors, mirrors, precision adjustable mirror mounts: (K115) + very bright 650NM laser (LM2) module.

PLANS/NOTES ON FLOPPY \$9

****LOOK** LOOK** LOOK** NEW STEPPER MOTORS**

30 oz./in. torque, 2.5 deg. 144 step, low voltage, compact 57 x 38mm: \$14

COMPUTER CONTROLLED STEPPER MOTOR DRIVER KIT

can drive larger motors, Has optoisolation. Inc.

Software & notes: \$40 Or

\$50 with two Used 23 frame 200 step 1.8 Deg. motors!

CHECK OUR WEB SITE FOR DRIVERS

OPTO PACK 104 devices: various colours

& types. Top brands. Siemens etc. just \$10

VISIBLE LEDs...5mm...14X Yellow clear,

6X Red (clear) 24deg, 2X Yellow (clear)

24deg, 16X Red (clear) 24deg, 38X Green

(clear) 24deg. VISIBLE LEDS...

3mm...14X Red diffused 70deg. 4X 3mm

or rect. Yel. diffused 70deg SPECIAL...1X

5mm IR, 3X 3mm Clear Phototransistor, 3X

5mm Phototransistor, 1X IR RX module,

2X DIL rect. black PIN Photodiode.

UNIDIRECTIONAL ELECTRET MICROPHONE: With tie-clip, plug and lead.

Application notes supplied \$4

EA-MAY-99

BRAND NEW GERMAN MADE DUAL PRINTER / SCANNER MECHANISM

Made in 98, worth \$1800!! Made for a govt. contract that failed. Use it "as is" or "Pull it apart" to recover.

SIX MINEBEA STEPPER MOTORS,

2x 4 wire type 23LM-C355-38V 50x55mm

3x 4 wire type 17PM-303-04V 37x42mm,

1x 4 wire type 17PM-M007-02, 42x33mm,

PCB WITH SGS STEPPER DRIVER IC'S.

POWERFUL, COMPACT, SW-MODE

P.S. WITH FAN: 240V input, output

1+5V/8a, -12V/1.5a, +12V/1a, +32V/4a.

NUMEROUS OTHER PARTS:

Include 24 PIN PRINT HEAD, OPTICAL

SCANNER CPU, EPROM, matching

BELTS & PULLEYS two GEARED

MOTOR ASSY'S with micro switches,

MAINS FILTER etc. etc.

UNBELIEVABLE PRICE: \$36

Printer ribbon to suit \$5, extra. Delivery to most Aust. cities \$12, box approx. 0.25 CM - 15Kg

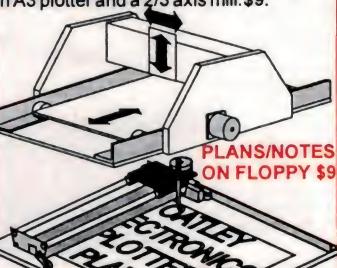
MORE INFO, LINKS AND PHOTOS IN BARGAIN CORNER ON OUR WEB SITE

NEW MOSFET VERSION OF OUR 1/2/3

AXIS CNC(Computer numerical control) SYSTEM.

This system includes a new stepper motor driver kit (one kit required for each axis) designed to be used with software freely available on the Internet for use with home or professionally built a milling machine, lathe, engraver or cutter etc. with home & limit switches & a high degree of accuracy (can be better than .001". We supply the kit inc. PCB all onboard parts etc. plus Internet resources for shareware software & building or buying mechanical components. Around \$40 per axis. Call for details.

BUILD YOUR OWN COMPUTER CONTROLLED 2/3 AXIS CNC MILLING MACHINE / ENGRAVER OR PEN PLOTTER: Using the parts of the above printer, with the above stepper drivers and software and with the addition of about \$10 worth of materials from your local hardware store you can build the machine of your choice. Plans/notes on floppy for an A3 plotter and a 2/3 axis mill: \$9.



****LOOK** LOOK** LOOK****

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5mm Phototransistor, 1X IR RX module,

2X DIL rect. black PIN Photodiode.

UNIDIRECTIONAL ELECTRET MICROPHONE: With tie-clip, plug and lead.

Application notes supplied \$4

FEEL THE POWER

\$89



CMOS camera module

B&W module ideal for connecting to a surveillance or alarm system. Features 1 lux F/1.4 illumination, 300 TV lines resolution, 1/50, 1/60 to 1/6000 sec. auto shutter function and more. L 5875

\$195



Waterproof digital pH meter

This ergonomically designed unit is for use in aquariums, swimming pools, spas, hydroponics and many more applications.

Q 1415

\$199



STATPOWER
Engineering the New Age of Power

12V inverter

Enjoy the convenience of Household AC Power where you want it. Simply plug into a cigarette lighter socket. Suitable for entertainment & office products and appliances.

M 5017

\$1299



MITSUBISHI

24hr time lapse VCR

An ideal video system for automated security and surveillance systems. Designed especially for industrial, educational and security recording.

L 5846

\$245



FLUKE Electrical tester T5-1000

This electrical tester features voltage, continuity and current in one compact tool. OpenJaw™ current lets you test current up to 100A without breaking the circuit. Q 1631

\$2395



FLUKE Scopemeter 123 20MHz

Ideal for troubleshooting industrial machinery, instrumentation control and power systems. Combines a scope, meter and recorder in one handheld package.

Q 1644



All major credit cards accepted

All savings shown are off our regular prices. If a currently advertised product is sold out or unavailable due to circumstances beyond our control, we will issue a raincheck for later purchase of the item or an equivalent at the advertised price if a suitable product is available. Products advertised as limited, discontinued or clearance are available only while stocks last and rainchecks do not apply. We reserve the right to limit the quantity per customer to normal retail quantities.

MOORE PARK -- Moore Park Sup a Centa, Cnr South Dowling St & Todman Ave. Tel: 9697 0244

BANKSTOWN -- The Christie Centre, Cnr Chapel & Canterbury Rds. Tel: 9793 9677

PENRITH -- Corner of Mulgoa Road and Batt Street. Tel: (02) 4721 1544

CARNEGIE (VIC) -- 1048-1054 Dandenong Road. Tel: 9569 2644

**DICK SMITH
ELECTRONICS**
**POWER
HOUSE**